

FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 629 (No. 2, Vol. XIII.)

JANUARY 13, 1921

Weekly, Price 6d.
Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2

Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828

Annual Subscription Rates, Post Free:

United Kingdom .. 30s. 4d. Abroad .. 33s. 0d.*

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates

* European subscriptions must be remitted in British currency

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

Jan. 20 ...	Lecture, "The Cost of Air-Ton-Miles, Compared with other Forms of Transport," by Lord Montagu of Beaulieu, before R.Ae.S.
Feb. 20-22	Aero Club of France Grand Prix
Mar. 20-22	Aero Club of France Grand Prix
April 20-22	Aero Club of France Grand Prix

EDITORIAL COMMENT

PARTURIUNT montes, nascetur ridiculus mus. After all that has been said about the seriousness with which the present position of civil aviation is regarded by the Government and of the concrete schemes of encouragement it was proposed to extend to the industry, we now know exactly what is to be done. Having saved a clear £500,000 on the civil side of the Air Estimates, the Cabinet has generously decided to subsidise the air lines operating from this country to places across the narrow seas, and any others which may be prompted by this unexampled generosity to come into the business, to the tune of £60,000 during the next financial year. It is a little better than nothing, but not much.

Encouraging
Civil
Aviation

Far be it from us to look the gift horse in the mouth, or to join issue with the principle involved in the proposed subsidies to the air lines, but we cannot help expressing the view that it is wrong from two points of view. In the first place, the sum allocated is not enough. The Advisory Committee, which was appointed for the express purpose of advising the Government as to the shape and scope of the assistance to civil aviation which is, and may become, necessary, laid down that £250,000 should be spent over a period of two years, at the end of which time the whole situation could be reviewed. After a careful study of the facts on which the Advisory Committee based its advice, we remain of opinion that if that Committee erred at all it was on the side of making its estimate of requirements too small to be thoroughly effective. However, let the Committee's figure stand. We now see that what the Cabinet proposes to do is to allocate a sum of, roughly, half the annual grant advised, and to pay it for one year instead of two.

Apart from the parsimoniously small sum to be made available, we seriously question the policy of a grant for a single year. There is nothing so desirable in these things as looking ahead and arranging for continuity of policy. It has always been a weakness of British Governments that they have conducted their legislative affairs on a hand-to-mouth principle, and not seldom the consequences have been well-nigh disastrous. We had a lurid example years ago, when this want of a continuous policy landed us in a huge expenditure on the Navy under what was known as the Spencer programme. Money had been grudged and shipbuilding allowed to fall into arrears until we were awakened to the realisation that we were hopelessly inferior in naval strength to the next two naval Powers—those were the days of the "Two-Power standard"—and it cost the country many millions to overtake the consequences of the penny wise, pound foolish, policy of successive Cabinets.

That is what seems likely to happen in connection with civil aviation, to which we have to look to provide the bulk of our fighting air forces in the day of emergency. France is fast going ahead of us. Germany is making strenuous preparations to challenge the rest of the world in the air. We are footling and fooling with the proposition, and regarding it, apparently, as one of those things the consideration

of which can be left until to-morrow. In the meantime, the Government, feeling that something has got to be done to keep people quiet, hands out a dole of £60,000 to assist in keeping alive an industry upon which we shall have to depend again for our very national existence when next we become involved in war.

We quite appreciate that there is a strong current of opinion which holds that there cannot be another great war for a couple of generations. We quite agree that the main lesson of the last war was that war does not pay either the victors or the vanquished. But we also cannot get away from another basic fact, which is that such considerations as these do not and never have influenced nations in making or refraining from war. There will always be wars, and the best manner of bringing them about is by being weak and unprepared for defence. Unless we are prepared we are simply inviting attack, and unless civil aviation is encouraged to the point at which it can provide us with sufficient reserves for the fighting Service we must remain unprepared. We would commend to the earnest consideration of the Government the extract we published a week ago, from the Report of the United States Advisory Committee on Aviation. If that, added to the irrefutable arguments which have been adduced by British authorities, will not convince the Government that a strong and virile reserve air force is not worth more than a beggarly £60,000—not even £60,000 a year—then they will be convinced by nothing in this world.

“Economy” in the R.A.F. Economy is a very good horse indeed, but it is possible to ride it to death. A very well-known authority on aviation, who is largely interested in the

future development of flight, recently gave us some of his views on a number of questions relating to the movement, Service and civilian. He was especially severe on the measures of so-called economy which are being applied to both sides of aviation. Asked for his views regarding civil aviation and its position, he tersely summed up the situation in a single word: “Rotten.” He was particularly critical of the present administration of the R.A.F. As he pointed out, there is an elaborate and apparently sound system of training units for the R.A.F. in being. It is costly, but worth the money if well and truly carried out. The trouble begins later, since it is a fact, he says—and this is borne out by our own information—that while cadets are given an excellent and thorough primary training, the fully fledged R.A.F. pilot is now, practically speaking, kicking his heels. Little or no useful practice flying is done at the stations, such as night-flying, cross-country work and so on. If this is true—as we believe it to be—it would seem that we are spending a lot of money in giving the cadet a good and useful training in the first place, only to throw it away later by allowing the pilots of the Force no opportunity of improving as practical aviators or even of keeping up the relatively high standard which is insisted upon in their initial training. All this, of course, is happening in the sacred name of economy. It is only what is to be expected of a system which throws away millions on the salaries of Whitehall and starves the useful Services for money. Better that money should be found so that not a Treasury clerk may lose his job than that the bureaucrats should have to

do a day's work for a day's pay in order that we may have efficient fighting Services on which the safety of the Empire may again depend!

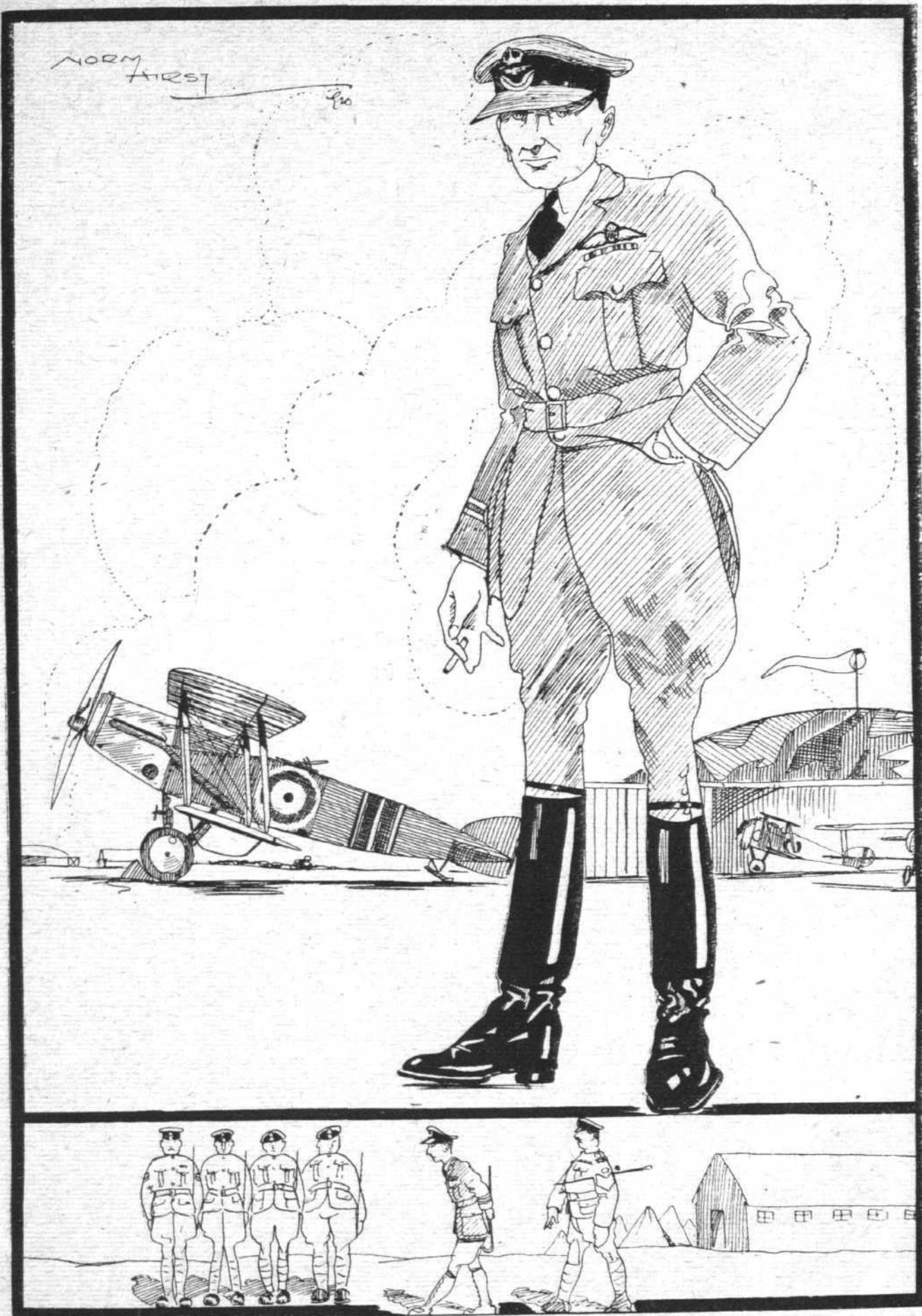
The remedies suggested for the present state of things are, it is suggested, that the Government should carry out a full programme of experimental work which would ensure that the best pilots would get plenty of useful experience of the work which is the nearest approximation to war flying in time of peace. Then, every R.A.F. pilot who has completed his full course of training should be passed to a species of civilian reserve, the work of which should be aerial mail carrying and the conveyance of passengers and goods. These services should not be conducted by the Government—with the telephone ramp so close to us we none of us want to see Government administration of any public commercial service—but by civil enterprises to whom the pilots would be lent for a period of duty. From time to time these pilots would be called back to the R.A.F. for instruction and practice in war flying at R.A.F. stations.

There may be nothing that is particularly new in these suggestions, but they are nevertheless well worthy of consideration, since they, at all events, embody the ideas of one who is very competent to speak and are eminently common-sense in their bearing.

A Ministry of Defence?

Are we getting near to the time when the whole of the fighting Services will be grouped under a single Ministry of Defence? We are impelled to ask the question because of what we consider a very significant announcement which appeared in *The Times* the other day. A short paragraph from the Parliamentary correspondent of that journal set forth that the Army and Air Estimates for next year have been before the Finance Committee of the Cabinet, but have both been referred back to their respective Ministries for reconsideration. The view of the Government is understood to be that these and the Navy Estimate should be dealt with as a whole and not as separate entities. It also seems to be thought, the paragraph continues, that considerable economies might be effected if the framers of the Estimates were to subject them to a critical revision, as the not unnatural tendency is to adopt a generous rather than a parsimonious scale in the first draft of Estimates.

We do not remember ever having heard of Estimates for the Services being referred back on these grounds before. We can understand in present circumstances their being referred back on the ground of excessive demands upon the purse of the nation, but that they should go back in order that all three may be considered as a whole is something new to us. Hence we have been prompted to ask the question with which we began this article. For a long time now it has been said that there is a powerful section of opinion, both inside and without Government circles, which favours the idea of creating a central Ministry of Defence, with Under-Secretaries, responsible to the Minister, for the Navy, the Army, and the Air. The matter has been discussed in most of its bearings, but we do not seem to think that anything approaching unanimity of opinion has been secured. That this should be we can readily understand, because there are very many apparently unanswerable arguments to be adduced in favour of centralising



Aviatic Types—Civil and Otherwise

THE SERVICE PILOT

control in the hands of one Minister for Defence, but just as many and equally cogent against the adoption of so revolutionary a change. For our own part we are not particularly enamoured of the idea, especially in the light of the experience gained by the present quality of office held by the Secretary for War and the Air. Without the slightest wish to belittle the truly brilliant work which Mr. Churchill has done for the nation and the Empire, we are nevertheless convinced that he would have made a better Secretary for War if he had not been Air Minister at the same time, and, conversely, he would have done better in Kingsway if he had not at the same time had an office in Whitehall.

What might have happened if he had had the Navy to look after as well we should not like to hazard a guess, though it is only fair to say that a Minister of Defence, presiding over a properly organised Department, would not actually be in the position

occupied by the present Secretary for War, in which he has the whole of the work of two great Departments of State to oversee. When the question is examined in detail, there seems to be a good deal to be said for the closer co-ordination of the three Services, but there is always this to be taken into account, that none of the Great Powers have ever adopted the principle we are discussing. That is not to say it is wrong, but it is significant nevertheless that it is only the smaller Powers and certain of our own self-governing Dominions, with relatively small interests and small forces to protect them, that have adopted the principle of a single Ministry. All the great military and naval Powers have preferred to keep the administration of the Services several and distinct from each other. From that point of view alone it would seem that very mature consideration is essential before the principle is adopted—if indeed its adoption is being seriously entertained.



AIR MINISTRY SUBSIDIES FOR CIVIL AVIATION

THE Air Ministry announces that the Cabinet has approved, subject to Parliamentary sanction, the grant of a sum for the direct assistance of Civil Aviation.

During the financial year 1921-22 payments under this grant will be limited to a maximum sum of £60,000, and will be made to British companies operating on approved aerial routes. They will be calculated, subject to the above limitation in regard to the total sum available, within the year, on the basis of 25 per cent. of the total ascertained gross revenue of each company (exclusive of the Government grant) earned by the carriage of passengers, mails and/or goods, on and after January 1, 1921.

No differentiation will be made with regard to the class of load carried, and payments will be allotted on the return for each period of three months treated separately, provided that the company can show that on a minimum of 45 days in each period of three months (or such other factor of regularity as may be determined later by the Air Council) flights have been completed in both directions by aircraft of British manufacture fitted with British-made engines within a fixed maximum period of time allowed for each journey.

The routes at present approved are London to Paris, London to Brussels, and London to Amsterdam.

Extensions to these routes and additional routes, such as England-Scandinavia, on which the possibilities of a service employing flying boats or amphibian machines, or a mixed service of sea and land aircraft, can be demonstrated, may be approved from time to time if satisfactory proposals are received by the Air Council.

The maximum time allowed for journeys between London and Paris, between London and Brussels, and between London and Amsterdam, will be four hours from aerodrome to aerodrome (or such other time-limit as may be determined later by the Air Council).

Payment of the grant will be subject to the production for departmental inspection, when required, of such accounts and records as the Air Council may deem necessary.

Any British company intending to run on the routes and notifying the Air Council of this intention, will become an "approved" organisation by fulfilling the conditions laid down.

Such notification should be addressed to the Secretary (C.G.C.A.), Air Ministry, Kingsway, W.C.2, to whom requests for further particulars in respect of the grant should be addressed.



COLONEL SIR H. A. VAN RYNEVELD HONOURED

At the Office of the High Commissioner for South Africa on January 6, a gathering took place for the purpose of presenting to Col. van Ryneveld (of Cairo to the Cape-by-air fame) a large, specially-embroidered South African Union flag as a "send-off" gift to him upon his departure at the week-end for Pretoria to take up the position of First Director of the Union of South Africa Air Force. Lord Desborough, President of the Imperial Air Fleet Committee, made the presentation. The flag, designed and embroidered by Mrs. Fairfax Scott, which is to hang in the South African Air Force Headquarters, Pretoria, is to serve as an historic souvenir of the great pioneer South Africa Government flight, the first to link up in the air London with the Cape of Good Hope, and also of the two Imperial Air Fleet aeroplanes, which were presented to South Africa under the organising auspices of the Imperial Air Fleet Committee, viz., the I.A.F. "South Africa," and the I.A.F. "City of Birmingham," the gifts respectively during

and after the War of the London and Birmingham Chambers of Commerce. Col. van Ryneveld is the official pilot of the I.A.F. "South Africa"—a D.H.9 machine, the same type with which he flew the last thousand miles to the Cape, and Major van der Spuy, who lately returned from a Bolshevik prison in Russia, will be the pilot of the I.A.F. "City of Birmingham."

Before leaving England, we are glad to learn that Col. van Ryneveld said that as a result of the assistance and gifts of the Home Government, Pretoria would have the finest aviation workshops in the world, and that he anticipated great developments for aerial services in South Africa, both for Government and for civilian purposes.

It would seem from this that the South African authorities had got a hustling mood on since last we had occasion to comment upon the impasse in aviation affairs which had apparently come to pass.



A Subsidised Concern in Belgium

AN aeronautic construction company has been founded in Brussels. The Belgian Government is said to be supporting the scheme with a view to rendering Belgium independent of foreign aerial transport.

Commercial Aviation in Belgium

A REPORT published in Belgium shows that on the Brussels-London service 130 trips were made between June 19 and September 30; 187 passengers were carried, 1,000 kilogs. of goods and 337 kilogs. of mail matter. On the Brussels-Paris service from June 18 to August 23, 217 trips were made,

164 passengers were carried as well as 675 kilogs. of goods and 95 kilogs. of mails. In the Belgian Congo a service was regularly maintained between Kinshasha and Combe by four waterplanes.

A New Italian Speed Prize

SIG. LUIGI MAPELLI, who last year presented prizes for a competition for small machines in Italy, has now offered to the Aero Club of Italy a prize of 50,000 lire (about £2,000 at pre-War rate of exchange) for a speed contest. The course will be 150 kiloms. for the first race, and it will be doubled for each of the two succeeding events.

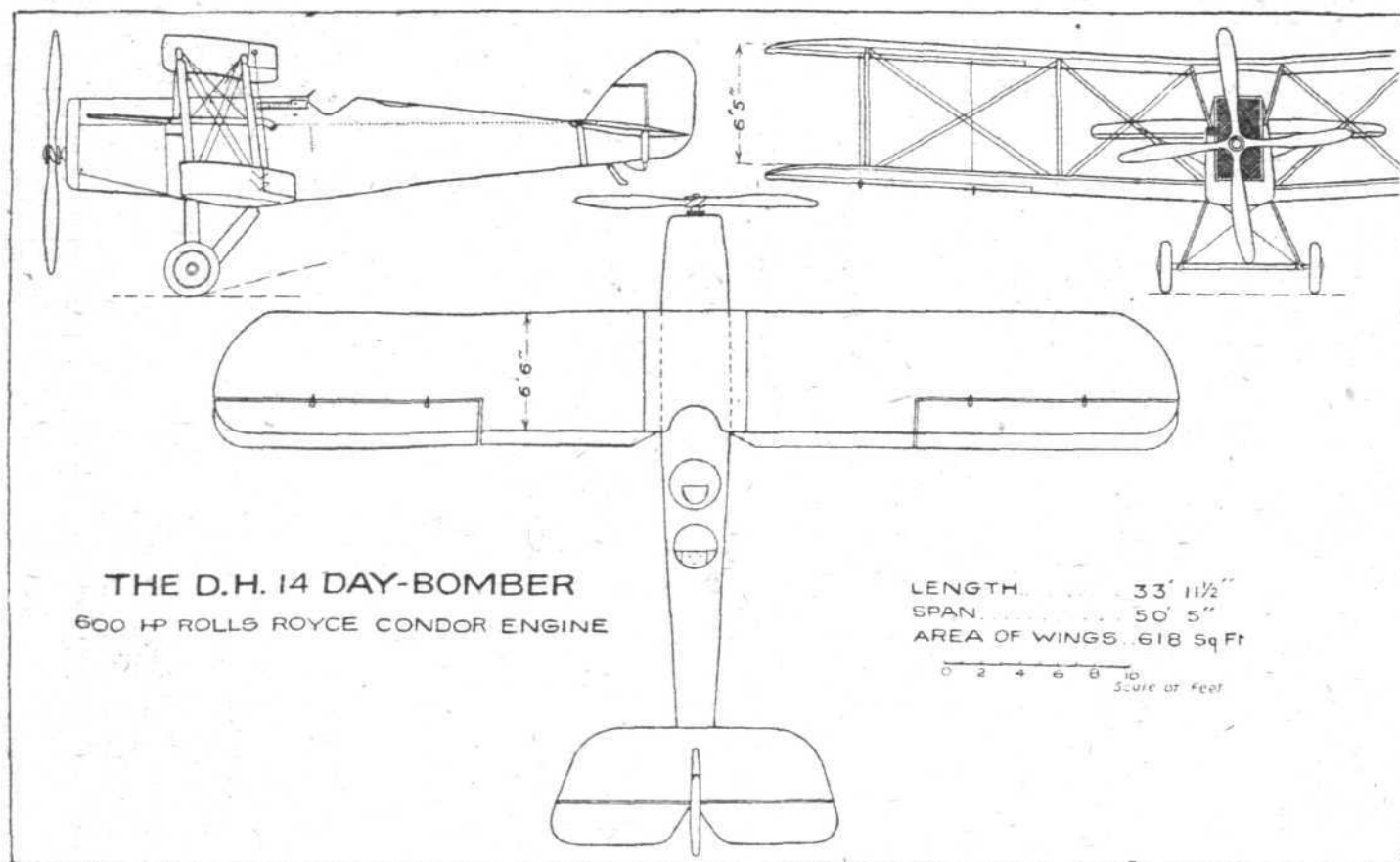
THE DE' H. 14 DAY-BOMBER

600 H.P. Rolls-Royce "Condor" Engine

THE announcement recently of the formation of the de Havilland Aircraft Co., Ltd., with offices and works at Stag Lane Aerodrome, Edgware, Middlesex, was received with the greatest satisfaction by everyone who appreciated the extensive and excellent designing work done by Capt. de Havilland during the last seven years. It was equally indicative of a famous designer's belief in aviation, and of the fact that his services were not to be lost to the country. Since that announcement first appeared, a few months ago, there has been great "busy-ness" at Stag Lane, and the first results of the activity are now beginning to take shape at the works, in the form of some new day-bombers and one commercial machine. The former, although new as regards actual construction, are really of fairly old design, the preliminary designs and estimates having been got out during the latter part of 1918.

The D.H. 14, shown in the accompanying general arrangement drawings, was designed for long-distance day-bombing, and might, had the War continued a little longer, have given the good Berliners some pretty bad "strafing." As it was, however, she was too late for this particular purpose, although

supported on bulkheads of multi-ply wood, very similar to those familiar from previous de Havilland types. A large nose radiator is fitted, provided with pivotted slats operated from the pilot's cockpit. By means of these slats the amount of cooling can be varied from the maximum of which the radiator is capable to entire blanketing when the slats cover the whole front of the radiator. The oil tank is mounted behind the aft end of the engine. The petrol tank is placed just aft of the rear engine bulkhead, and a feature of the petrol system is that the gravity tank forms the upper portion of the main tank, the fuselage being sufficiently deep to ensure an ample "head" of petrol to the carburettor. Normally petrol is fed direct to the carburettor by means of either or both of two independent pumps driven by small windmills projecting from the deck of the fuselage. Thus there are available virtually three independent petrol feeds, two by pumps and one by gravity. Normally the gravity tank is only used for starting off and alighting, but a sufficient supply is carried in it to enable it to be used in case of emergency, as it contains enough fuel for more than half-an-hour's duration.



THE DE H. 14: General arrangement drawings

the design was not cancelled. Owing to the exceptional conditions during the years following the War, and to the various readjustments of the Airco firm during recent months, the actual work of construction was much delayed, and it is not until now that the first of these machines is actually nearing completion.

Having been designed for the new Rolls-Royce "Condor" engine, the D.H. 14 has also had to await the production of its power plant in a fairly final form, and with its great 600 h.p. engine it is now probably one of the highest-powered single-engined fighting machines in the world. As such it is therefore of more than usual interest, quite apart from the importance which always attaches to the work of a well-known designer.

The Power Plant

As already mentioned, the power plant consists of a Rolls-Royce "Condor" engine, of approximately 600 h.p. This engine, which bears a certain family resemblance to the famous R.R. "Eagle," is a twelve-cylindered Vee-type water-cooled engine, designed to supply in one unit somewhat greater power than that provided by the "Eagle." It is mounted on tubular bearers of generous dimensions, which are, in turn,

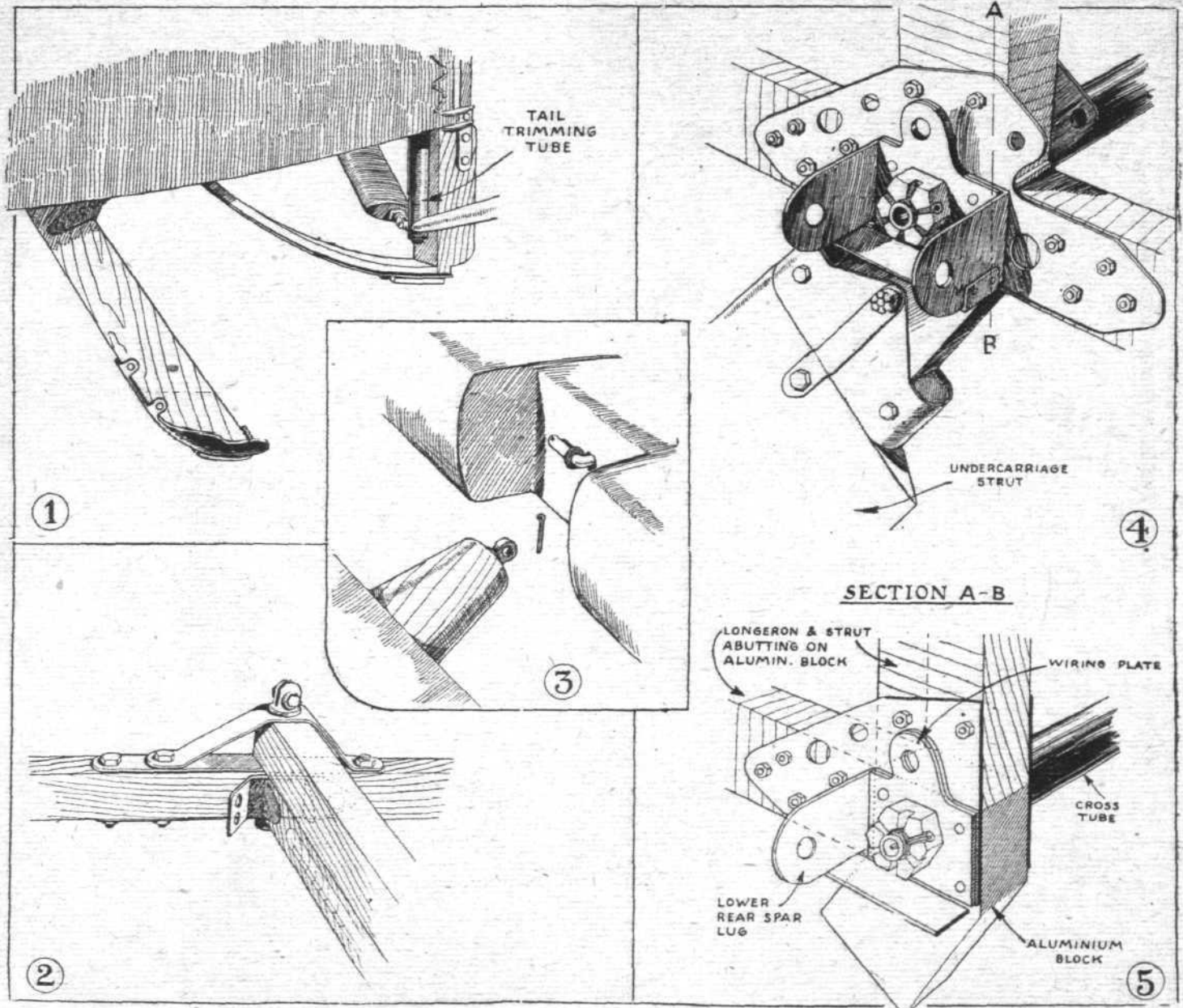
Crew and Armament

The de H. 14 is designed as a two-seater, with the pilot in the front seat, and a gunner behind him in a separate cockpit. The pilot's armament, apart from the bombs, consists of a Vicker's gun placed on the port side, pointing along a groove in the deck fairing, and the projectiles just clearing the port camshaft of the engine. In this position the machine gun is well out of the way of the pilot, yet it is easily accessible. The gunner's cockpit is provided with the usual Scarff gun ring, and his field is improved by doing away with top bracing of the tail plane, this being accomplished, in the de H. 14, by tubular struts underneath. The pilot's cockpit is provided with a very large instrument board, on which are mounted all the usual instruments in such a way as to be easily readable. Perhaps the only instrument which calls for any special comment is the new Smith's petrol gauge. So far as could be ascertained, this instrument is a form of "U"-tube connected to a graduated dial on the instrument board. When it is desired to ascertain the amount of petrol in the tank, a few strokes on a small hand-pump bring the pointer to zero. If the pointer is then watched it will be seen to creep steadily up to a certain figure, which indicates the amount of fuel left.

After about 30 seconds or so the pointer continues upward, and for the next reading the pump is again called into service.

In addition to the defensive armament already referred to, the de H. 14 carries a very useful "nest" of six 112 lb. bombs, carried in two double and two single crates inside the fuselage ahead of the pilot's cockpit. The fuselage floor is open at the points underneath the crates, but to prevent draught the openings are covered with sheets of brown paper, which is easily torn by the weight of the bombs. The bombs are normally under the control of the gunner, who releases them by means of a series of toggles on the starboard side of his cockpit. Provision has, however, been made for enabling the pilot to discharge the bombs, should necessity arise, by a similar set of toggles in his cockpit.

longerons running right through, but in the de H. 14 they are cut up into relatively short lengths, the ends of these lengths abutting upon an aluminium block which thus serves, to mention the example of the rear undercarriage strut attachment shown in the accompanying sketch, as a base for the ends of two lengths of longeron, one vertical strut, one chassis strut, one cross tube, one spar lug, and diverse wiring plates. Fundamentally similar blocks are used elsewhere in the design, and the whole fuselage is made up of lengths of perfectly straight longerons, with which arrangement the aluminium block system would appear to be eminently satisfactory. As regards the other fittings of the fuselage, these remain practically identical with those of previous types. Thus the fittings of the rear portion are of the type in which a bolt passes through



THE DE H. 14 DAY-BOMBER: Some constructional details: (1) The tail skid and auxiliary skid protecting the tube of the tail plane trimming gear. (2) The eye bolt mounting of the front spar of the trimming tail plane. (3) An aileron hinge. (4) The joint between rear undercarriage strut, lower longeron, and lower rear spar. (5) Part-sectioned view of (4). The longerons are cut through and abut on an aluminium block. They are held in place by bolts through the steel plates

Fuselage Construction

As the machine is primarily a military one, the questions of armament have been dealt with first. From a constructional point of view, however, the de H. 14 is also of interest, especially as regards the construction of the fuselage, in which some departures from standard practice have been effected. For small and comparatively light machines it has for years been standard practice to attach the chassis struts to sockets resting on the lower longerons. Usually the lower wing spars are secured at this point also, so that a number of structural members meet here. For heavy, heavily-loaded and fast-landing machines it has, however, been found that the landing shocks are apt to crush the wood of the lower longerons at these points, and an attempt has therefore been made in the de H. 14 (first we believe, experimented with in the de H. 11) to avoid this by a rather drastic modification in the whole design. It has always been usual practice to have the

strut socket, wiring plate and longeron, vertical and horizontal struts being slightly staggered in relation to one another so as to allow their respective bolts to clear one another. The internal bracing is by means of streamline wire.

The Undercarriage

With the exception of the attachments of the struts to the lower longerons the undercarriage is similar to previous ones. That is to say the strut Vees are of wood, with very substantial connections at the apex, and the axle rests in a faired casing and is sprung by rubber cord. The tail skid is also of wood, with a steel shoe, to the sole of which are welded steel wearing edges. An innovation is found in the guard which curves around the lower end of the vertical tube of the tail plane trimming gear. This guard forms an auxiliary tail skid, so that should the main skid be damaged the guard prevents damage to the trimming gear.

Tail Planes

As regards the tail, everything appears to be of standard de H. design, with the exception of the tail plane bracing. Instead of the ordinary wiring above and below the tail plane there is now no bracing on top, this function being performed by tubes below the plane. The front spar of the tail plane is carried on two eye bolts, as indicated in one of our sketches, and the rear spar is raised and lowered by means of a worm and an internally threaded bobbin operated by an aluminium wheel on the left wall of the pilot's cockpit.

Main Planes

The wings also are of standard design, both as regards form and construction. There are two pairs of inter-plane struts on each side, and the top centre section is carried on outwardly raked struts. All struts are of spruce. The inner rib of the lower plane is given an approximately streamline section so as to merge into the curve of the bottom of the fuselage. Large ailerons are fitted to both top and bottom planes, and are

hinged as shown in our sketch. An L-shaped bolt passes through the aileron spar, and over this passes an eye bolt on the rear wing spar, a split pin securing the aileron in place. The sketch is, we think, self-explanatory.

The main data of the de H. 14 are as follows:—

	lbs.
Weight empty	4,484
Petrol (178 gallons)	1,280
Oil	160
Crew	360
Military load	1,380

Total weight fully loaded ..	7,664
Speed at 10,000 ft.	122 m.p.h.
Rate of climb at 10,000 ft. ..	400 ft./min.

On the original weights and power of the engine, when the design for this machine was first got out, the performance was slightly better, as the weight loaded was then only 6,930 lbs., which was estimated to give a speed at 10,000 ft. of 132 m.p.h.

AIR MINISTRY COMPETITIONS, 1920

THE Air Ministry have now issued a preliminary announcement in regard to these trials, which took place last year at Marthlesham.

These competitions were held during August and September last, with the object of ascertaining the best types of aeroplanes and amphibians which would be safe, comfortable and economical for air travel, and in the case of the amphibians, capable of alighting on and rising from water as well as land. Details as regards the rules of the competitions, the entries received, the actual competitors and the prizes awarded have already been published, and competitors have also received a technical report of the Judges' Committee.

The broad general conclusions of that Committee are summarised below.

One effect of the rules of the competitions was to encourage the production of aircraft having an ample reserve of power. To obtain this reserve without sacrificing economy or useful load entails the use of an engine of high power for its weight, but normally run well below its maximum power. The advantage thus attained in regard to safety is clearly shown in the greatly increased ability to arise out of a confined space, while the reduced normal strain on the engine largely assists in producing a reliable machine.

In spite of the higher first cost of such an aircraft it is almost certainly a better commercial proposition than a machine with the same normal performance and little or no reserve of power.

As regards landing in a confined space, the pilot's view and the controllability of the machine are two very important factors, and there is some tendency to place upon them insufficient weight.

The run on the ground after such landings can be reduced if suitable wheel brakes are fitted, and very promising designs were exhibited by some competitors.

The precautions taken by designers to avoid any risk of fire in the air and largely to reduce the risk of fire in the event of a crash showed that this important point had received due attention, and ideas embodied in competing machines will be of definite value in future designs.

The amphibians also displayed a marked advance toward safety in another direction. Capable of alighting on and rising from any practicable site on land or water they have a great

advantage over other forms of heavier-than-air craft, while the low position of the hull very largely reduces any risk of injury in the event of a minor accident on the ground.

This type of aircraft has a high potential value for commercial purposes as its use will in many cases very much shorten the distance to be flown, and also enable passengers to be landed on a river in the heart of a city instead of on an aerodrome some considerable distance outside.

In regard to twin-engined machines, further information was gained as to the conditions determining their ability to fly on one engine, and it was clearly shown that, given adequate attention to certain details of design, a twin-engined machine can fly on one engine, thereby increasing its reliability and safety.

Aircraft designed for commercial use show a marked advance in comfort over those originally designed for war purposes and afterwards modified to suit civil requirements. Seating accommodation, heating and ventilation arrangements have reached a very fair standard of comfort, but in this respect the question of silencing the engines has not yet had sufficient attention. The design of aircraft as affecting their economical use is of great importance commercially, and in this respect the competitions brought forward many excellent points in detail design.

The reduction in the number of parts subject to wear, and the increased accessibility of those requiring attention was attained in competing machines to such an extent as to offer a considerable improvement in economy of maintenance.

The rules of the competitions permitted the use of secondary equipment of foreign manufacture.

It is satisfactory to note, however, that the items of foreign equipment utilised by competitors were insignificant in number, and practically confined to petrol gauges, in which connection it was remarked that no really suitable gauge showing the quantity of petrol in the tank was fitted on any competing machine.

The magnetos fitted were all of British design and construction. While there is little doubt but that when a few mechanical details have been improved, the British magneto will be the best in the world, the results of the competitions show that the British magneto manufacturers are now abreast of any of their foreign rivals.

The Atlantic Fleet and Aircraft

THE aircraft-carrier *Argus* (Captain A. J. B. Stirling, C.B.), which was paid off at Devonport on September 21 to undergo a refit and certain alterations, was recommissioned at that port on January 5 with a Portsmouth crew for further service in the Atlantic Fleet. During part of the time she has been absent from duty with that Fleet, the new aircraft-carrier *Eagle*, originally the Chilean battleship *Almirante Cochrane*, has (*The Times* states) been performing her duties, but that vessel has now been reduced to the reserve at Devonport.

The *Argus*, built by Messrs. Beardmore and Co., at Dalmuir, was originally intended as a passenger and cargo steamer for an Italian company, but work on her was stopped after war broke out, and in 1916 the Admiralty acquired her for conversion to an aircraft-carrier. Her retention with the Atlantic Fleet in preference to the faster vessels *Furious* and *Vindictive*, which are capable of 30 knots, as compared with her 20, or to the more commodious *Eagle*, which, as re-designed by Sir Eustace d'Eyncourt, has a displacement of 26,200 tons, is probably due to reasons of economy. The after-War fleet organisation issued in April, 1919, provided for a Flying

Squadron of six carriers in the Atlantic Fleet, with the *Furious* as the flagship of Rear-Admiral Sir Richard Phillimore, in command of the Squadron. This force has now been reduced to one ship only, the *Argus*. The *Furious*, *Eagle*, *Ark Royal* and *Vindictive* are all in reserve, and the *Pegasus* is attached to the Mediterranean Fleet.

The aircraft-carrier *Vindictive* is to be used for another voyage to the Mediterranean as a transport for relief crews, and among those expected to travel in her to that station is Midshipman H.R.H. Prince George, who has been appointed to the *Iron Duke*, the Mediterranean flagship. The vessel will probably leave Portsmouth on January 24, when six midshipmen appointed to the *Emperor of India*, second flagship, will take passage out in the *Vindictive* with Prince George.

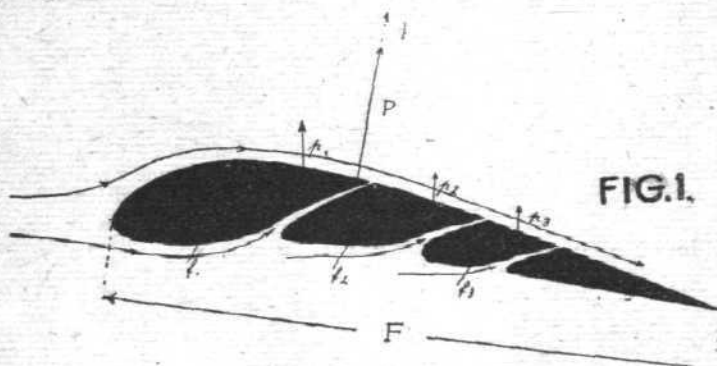
An Aircraft and Astronomy Lecture

PROFESSOR L. N. G. FILON, F.R.S., will deliver a public lecture on "The Navigation of Aircraft by Astronomical Observations," at University College, London, tomorrow, (Friday, January 14th), at 3 p.m. The lecture is open to the public without fee or ticket.

THE H.P. WING AND GERMANY

FROM an article which appeared in the German aviation journal *Flugsport* it seems that Mr. Handley Page is not the only designer to arrive at the slotted wing as a means of obtaining increased lift. It appears, however, that the German inventor was refused a patent because, in the opinion of the German Patent Office, there did not appear to be any reason to suppose that such a wing would give greater lift than the orthodox aerofoil. Following is a translation of the article in *Flugsport* :—

"We learn that already in February, 1918, the same idea (as the H.P. wing.—Ed., *FLIGHT*) was placed before the Patent Office by Herr Otto Kattler on behalf of the inventor Herr G. Lachmann, of Darmstadt. The specification is as follows : 'Aerofoils whose profile consists of several separate staggered elements, arranged in the form of a Venetian blind.' The claim was founded on the following considerations : 'The lift of a curved plane moving through some medium is composed of a positive pressure on the lower surface and a negative pressure on the upper surface of the plane. The present invention has for its object an increase in the lift of an aerofoil.



To achieve this the thick aerofoil F is divided into auxiliary sections f_1, f_2, f_3 , Fig. 1.

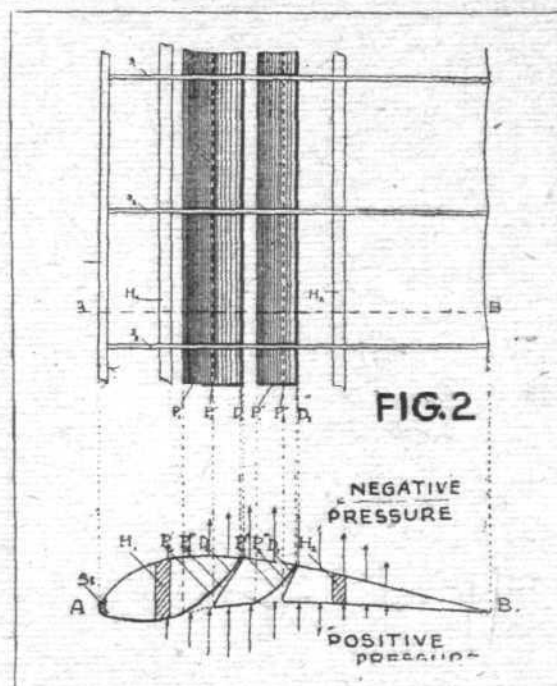
"The spaces between the auxiliary aerofoils have the appearance, in section, of nozzle-shaped channels, with their narrow ends on the upper surface of the main aerofoil. The air rushing past the narrow nozzle openings on the one hand, and the suction of the negative pressure on the upper surface of the aerofoil on the other, result in sucking air past the cambered auxiliary aerofoils, thus causing the new pressures P_1, P_2, P_3 ."

"The total air resistance W of the aerofoil is therefore composed of the sum of the pressures P_1, P_2, P_3 , etc., on the small aerofoils f_1, f_2, f_3 , etc., and of the total resistance P of the larger aerofoil F respectively. These will naturally be somewhat smaller than the resistance P of a solid aerofoil."

"In Fig. 2 is shown diagrammatically the constructional application of the invention to a modern aerofoil. In the space between every two ribs are arranged two plates of

ply-wood, sheet metal, Cellon, or some similar material, shaped to conform to the aerofoil section. By suitably shaping the plates a smooth run into the lower aerofoil surface is possible."

"The Patent Office has refused the application, the reason stated being that it was not necessarily to be expected that the lift of the aerofoil would be increased by the arrangement of slots. It was pointed out that, although the negative pressure on the upper surface is constantly being built up, it is being reduced by the air streaming up through the slots. To this the inventor replied in a further application :—'The vacuum over the upper surface is not stationary, as a space from which the air has been exhausted and which can be filled again by letting in air. The negative pressure above the upper surface of an aerofoil is caused by the rapid forward motion of the



machine, and is built up anew every moment. It cannot, therefore, be equalised through the slots, as the air rushing over the upper curve of the aerofoil at once re-establishes the original condition of rarefaction. By way of a practical example it is pointed out that the aerodynamic efficiency of an aerofoil depends to a minor extent only on the airproofness of the fabric covering. It is quite possible to fly with fabric which lets the air through, if only the surface is smooth. According to the objections raised this should not be possible, since an equalisation of pressures would occur."

"A complaint has been lodged, and the matter is now in the hands of the Appeal Department of the Patent Office."

No. XI Squadron R.A.F.

A RE-UNION dinner for officers of the above Squadron will be held at Kettner's Restaurant (behind Palace Theatre) at 7.30 p.m., on Friday, January 28. The price of the dinner will be 12s. 6d., exclusive of wines, etc. Those wishing to attend are requested immediately to inform R. E. Dangerfield, Mount Avenue House, Ealing, W. 5.

"A" Naval and 216 Squadron R.A.F.

It is proposed to hold a re-union dinner of all officers and men of the above squadron on April 2, 1921. Those interested are asked to communicate with Capt. E. D. Harding, 5, Belsize Square, London, N.W.

Martlesham Heath Reunion Dinner

A RE-UNION dinner for officers of the Aeroplane Experimental Establishment, Martlesham Heath, will be held in London on Friday, February 25, 1921. The time and place will be announced later. Will any old members of the station please communicate with Captain P. G. Robinson, Room A.139, Air Ministry, London, W.C. 2.

The N. Ontario Balloon Adventure

FURTHER information regarding the experiences of the U.S. Naval Airship officers, who on December 14 were driven

in their free balloon into the wilds of N. Ontario under storm stress, has been obtained by the New York *World* from the wife of Lieut. Hinton.

An Indian runner brought in a letter from Moose Factory, where the balloonists found refuge after four terrible days of wandering.

It describes how after every ounce of available ballast was expended the balloonists descended in a fog and abandoned the balloon. They eventually came across an Indian who led them to a trappers' camp. On the way they ate moss. The men were so exhausted from the cold—there were 40 deg. of frost—and the absence of food that Lieut. Stephen Farrell, according to Lieut. Hinton, "fell several times and wanted us to cut his throat and use his body for food."

Lieut. Hinton tells his wife that he succeeded in cheering the despairing man, and that they decided to stick and die together.

The three men who for the last 11 days have been travelling homeward in snow shoes, accompanied by Indian guides, have arrived at Mattice, on the Nall Trans-Continental Railway, the nearest railway station, 200 miles from Moose Factory, a journey of about 12 days in a dog sledge.

THE GLENN L. MARTIN COMMERCIAL TRANSPORT

AIRCRAFT, if it is to be successful commercially, can no longer be designed solely on the basis of performance as was done during the War. New standards have arisen. The efficient commercial aeroplane of today is judged on its commercial adaptability. Like the locomotive, the automobile and the ocean liner, the commercial features of the aeroplane are paramount. With this all-important factor of commercial aeroplane construction predominating, the Glenn L. Martin Company of Cleveland is designing a new machine which will incorporate every element of commercial adaptability. Among the principal points that are being carefully considered are the factor of safety, life of the plane, economy in operation, repair and replacement of parts, minimum work in upkeep, simplicity in housing and towing.

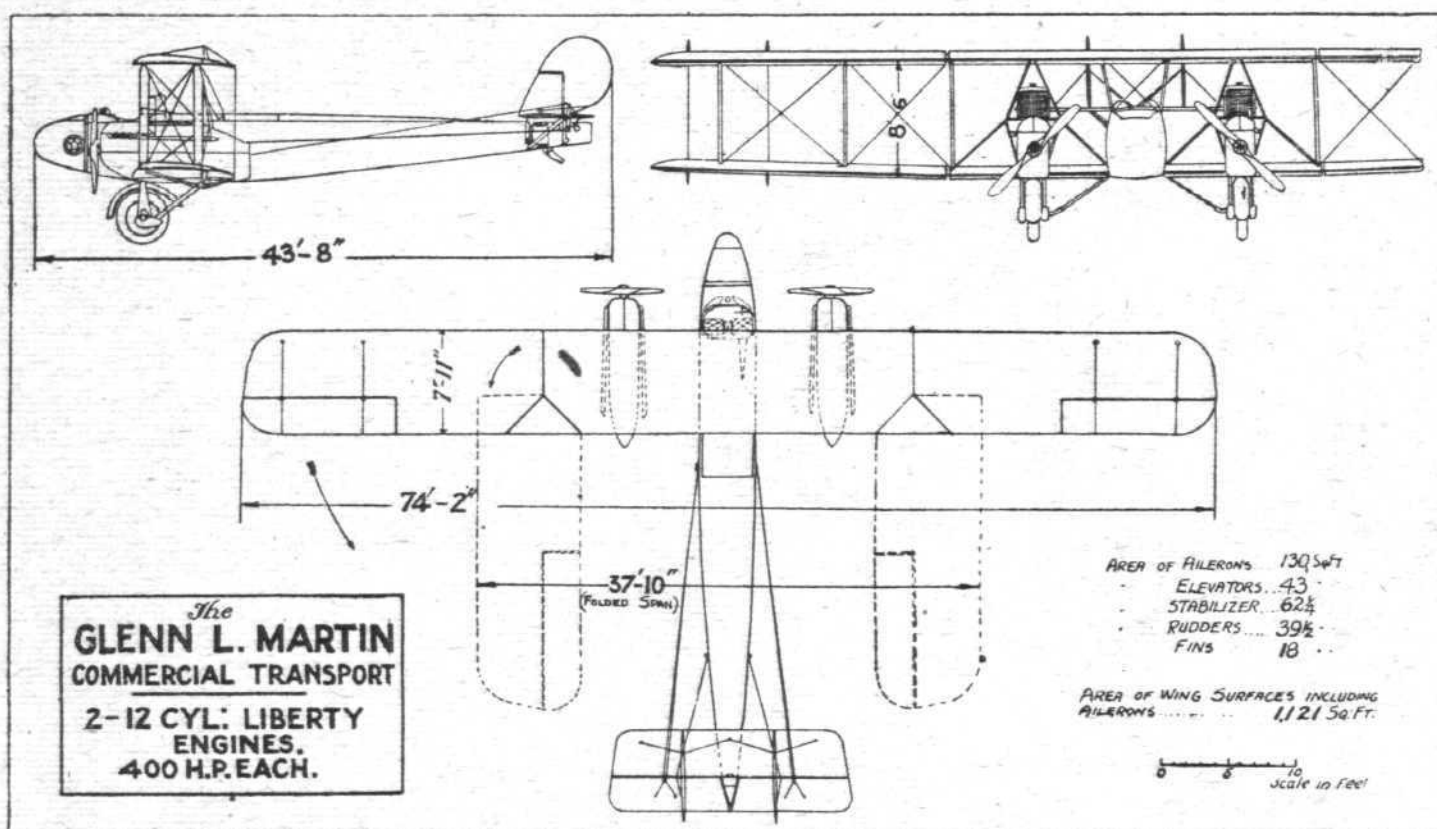
The Martin Commercial Transport is a twin-engine tractor biplane, and is similar in general design to the Martin Bombing and Torpedo planes that have proved so successful in the past.

The wings, which are of the folding type, are constructed in conventional truss form in the outer sections with front and rear spars and interplane struts and streamline wire bracing. The upper wing is made in two outer and one centre section and the lower in two port and two starboard panels—a total of seven panels. The interplane struts,

steel, with attached parts brazed and secured to the beams by through bolts with bearing blocks of metal. Fittings take interplane strut bolts; flying, landing, incidence and internal drag, brace wires. The internal wing wires are of solid steel fitted with adjustable terminals. The wings are covered with grade "A" linen and doped with four coats of acetate and two coats of nitrate dope, in the order named, the latter being impregnated with khaki wing enamel. The wood frames of the wings are wood filled and varnished.

The tail surfaces consist of elevator, stabiliser, two rudders and two vertical fins, all built upon the stabiliser. The elevator is hinged to the trailing edge of the stabiliser, and the rudders and fins are mounted on top of it. Entire unit is mounted on top of the fuselage and braced with steel tubing and steel tie-rods or cables. The tail surface unit may be detached intact. The stabiliser is adjustable from 0° to minus 4° from the pilot's cockpit, during flight. All tail surface frames are of steel tubing and are channel section. The frames are enamelled and covered with grade "A" linen. The covering is doped and finished with khaki wing enamel.

The fuselage is of general rectangular cross section, the maximum depth being 59 ins. and the maximum width 50 ins.



THE GLENN L. MARTIN COMMERCIAL TRANSPORT: Plan, side and front elevations to scale.

outside of the folding wing hinge, are of routed spruce; two front and two rear on each side of the wings. Tubular steel struts, faired with aluminium, are used at the folding wing hinge. The strut system around the motors, on the lower inner panels, consists of a truss work of steel tubes, faired with aluminium, which connects the nacelles to the body, to the landing gear, and to the upper wing. The wing truss wires are of streamline wire, fitted with terminals of clevis form.

Wing panels are built on two spruce spars, routed wherever possible to I-beam sections; the front spar is 10 ins. from the leading edge, and the rear spar 60 ins. In the inner lower wing sections, an auxiliary triangle of steel tubes, inside the wings, carries the stress in the lower rear spar from the engine nacelle to the front beam at the body hinge and to the hinge fitting at the rear of the cargo compartment, in the body. The ribs are of truss type, diagonal and vertical bracing, and are built of spruce; spruce drift struts are used to carry the drag loads and spruce box ribs, to close the ends of the panels.

The four ailerons are attached to the rear spars, upper and lower, at both sides of the machine. The ailerons are unbalanced, and do not extend beyond the contour of the wings. The wing fittings are of plate form, made of sheet

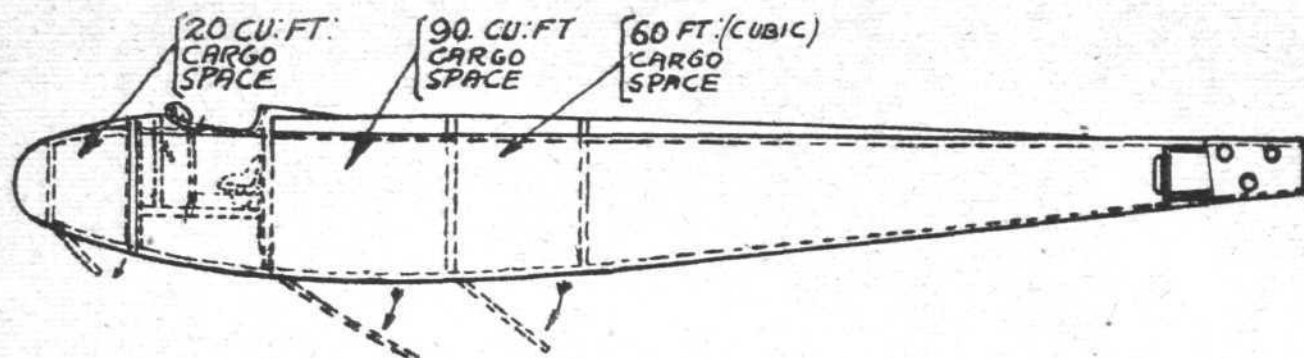
outside. The fuselage is built on four spruce and ash longerons, varying from a solid section to an "X" section, in going from nose to tail. The top longerons are horizontal in flight and parallel to the axis of the motors. The lower longerons taper upward toward the upper longerons as they approach the nose and tail. The forward section of the longerons is of ash spliced to the spruce. The longerons are solid at fitting bearing points; the nose is braced with 3/8-in. 3-ply birch walls and built up plywood bulkheads to the rear of the aft cargo compartment. The cargo compartments are lined with plywood, and are braced and reinforced to carry ordinary loads. A cradle and slings are provided in the central compartment for carrying heavy concentrated loads. From this point aft, the fuselage struts are spruce and are routed out to I-beam shape. These spruce struts are stepped in cup fittings, which, in turn, are brazed to the longeron fittings. The longeron fittings are of strap form, made from sheet steel, entirely circling the longeron; each fitting, with exceptions, accommodates six brace wires.

The fuselage flooring is of 3/8-in. 3-ply birch plywood, suitably braced and secured. Where spruce longeron struts are used, that is, from the pilot's cockpit back, the bracing is of solid steel tie rods. Fitted metal cowling is provided around the pilot's cockpit, and metal and plywood doors are

provided for the cargo compartments. The tail skid is mounted on a swivel post and secured for shock absorption with $\frac{3}{8}$ -in. elastic cord and $\frac{3}{8}$ -in. rebound rubbers. The skid is of hickory, provided with a cast steel shoe. All walls of the fuselage, not built with plywood, are covered with grade "A" linen, doped and finished in khaki enamel. The

cable. A gravity tank is provided in the upper wing over each motor, and a sight-glass in the overflow line enables the pilot to determine, at all times, whether petrol is being pumped to the gravity tank.

The entire petrol system is designed to withstand a pressure of 5 lbs. per square inch.



THE GLENN L. MARTIN COMMERCIAL TRANSPORT: Side elevation of the fuselage, showing arrangement of cargo compartments.

exterior plywood walls are also finished with khaki enamel; the interior wood parts are filled and varnished; interior metal parts are zinc plated, are covered with blue lacquer or both; the exterior metal parts are zinc plated and enamelled in khaki; wearing surfaces, etc., are greased.

The landing chassis is attached under the fuselage and engine nacelle, and consists of two 44 in. by 10 in. wheels and two nickel steel tubular axles. The axles are held in place laterally by the medium of sway braces attached under the fuselage, and support the machine by means of "A" struts. These struts are vertical, two being attached under each nacelle. The landing gear "A" struts are of nickel steel tubing, and are braced from the rear. Each wheel is shock-absorbed with $\frac{3}{8}$ -in. elastic cord, and the shock absorber is enclosed in a streamline case; mud guards are provided for each wheel. The landing gear "A" struts are streamlined with wood and covered, where necessary, with grade "A" linen, doped and finished in khaki enamel. The sway braces are streamlined with aluminium and magnesium fairing, and are provided with steps to facilitate work upon the motor when the engines are not running.

Each engine is mounted in the forward portion of its nacelle. The engine bed is built in the top of a vertical plywood bulkhead, braced laterally by a horizontal plywood bulkhead, connecting it to the nacelle longerons. A sloping bulkhead connects the forward end of the engine bearers to the front spar of the wing. The oil tanks are carried beneath the motors. The batteries are carried beside the starters at the rear end of the motors. Directly behind the rear end of the starters is an aluminium covered plywood fire wall, which runs from the top to the bottom of the nacelle. On top of the fire wall and outside of the nacelle is the radiator. Behind this fire wall, and separated from it by an air space, is the petrol tank. The latter ends at the rear spar where there is another vertical bulkhead. Behind this bulkhead is a fairing to streamline the nacelle. A removable cover is provided for this, making it available for the storage of tools, etc. Detachable cowling is also provided over the motors. All cowling on the nacelles is sheet aluminium.

The engine controls are carried to the fuselage through the wings, being run over pulleys at the nacelles and at the inner end of the wings and being run through straight aluminium tubes between these points. All controls are standard

The general specification of the Martin Commercial Transport is as under:—

Span, overall, both wings	74 ft. 2 ins.
Length, overall	43 " 8 "
Height, overall	15 " 6 1/2 "
Chord	7 " 11 "
Gap	8 " 6 "
Dihedral angle 176° from folding hinge out in lower wing	
Angle of wing setting to propeller axis	2°
Wing curve	Albatros.
Upper wing area, including ailerons	577 sq. ft.
Lower wing area, including ailerons	544 "
Total wing area, including ailerons	1,121 "
Ailerons (4)	130 "
Elevator area	43 "
Stabiliser area	62.25 "
Rudders (2)	39.5 "
Fins (2)	18 "
Total weight of machine, fully loaded	12,000 lbs.
Weight of machine, empty	6,840 "
Total useful load	5,160 "
Crew (pilot and mechanic)	360 "
Cargo capacity	3,000 "
Weight carried per sq. ft. of supporting surface	10.7 "
Weight per brake h.p.	15.0 "
Fuel capacity (2 main tanks)	280 gals.
Gravity tanks (2)	20 "
Oil capacity (2 tanks)	22 "
Speed, maximum, horizontal flight	110 m.p.h.
Speed, economical	100 "
Speed, minimum landing	52 "
Climb from sea level in 10 mins., fully loaded	5,000 ft.
Radius of operation, fully loaded under full power, 4 1/2 hrs.	
Radius of operation, at cruising speed	600 miles.
Ceiling	13,000 ft.

The equipment includes:—

Air speed indicator, oil temperature thermometers, altimeter compass, water temperature thermometers, clock, self-starters, inclinometer, navigation lights, lateral indicator, instrument lights, tachometers, trouble lamps, petrol level gauges, fire extinguishers, oil pressure gauges, ammeter, compass, all necessary switches, wiring, etc., safety belts, life preserver seat cushions, thermos bottles.

Aviation in Queensland

NEGOTIATIONS have recently been completed in South Queensland for an aviation scheme of much concern in Queensland. A company with a nominal capital of £100,000 has been formed, backed largely by Queensland pastoralists, for the purpose of establishing a regular aerial service between the outback stations and the railheads. The first two aeroplanes have been flown to the main base at Winton. The company promises to establish depôts at Winton, Longreach, Charleville, and Cloncurry, and to maintain a regular mail and passenger service between those four railheads. In addition, however, the Federal Government has been asked to co-operate by establishing or subsidising aerodromes at Camooweal, Avon Downs, Anthony's Lagoon, Newcastle Waters, and at Katherine, connecting with Darwin by rail.

This scheme would bring Darwin to from ten to twelve days closer to Melbourne than it is at present. By train from Melbourne to Charleville is about four days' journey; from thence to Katherine by aeroplane could be accomplished in about three days, with an extra day for the train journey to Darwin. Thus the journey, Melbourne to Darwin, and back, could easily be accomplished inside three weeks, even allowing two or three days for business at Darwin. A triplane will be used for a twice-weekly service between Charleville and Cloncurry. The aeroplanes, which will carry a pilot and two passengers, will be used principally for ordinary services between the scattered homesteads of Central Queensland and for general business purposes in place of motor-cars. As the service develops, aeroplanes and spares will be stationed at Longreach, Winton, Cloncurry, and Charleville.

THE LONDON-CONTINENTAL SERVICES

FLIGHTS BETWEEN JANUARY 2 AND JANUARY 8, INCLUSIVE

Route†	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and No. (in brackets) of Machines Flying
			Mails	Goods				
Croydon-Paris ...	6	6	1	4	5	h. m.	Spad F-CMAV (1h. 52m.) ...	B. (2), G. (1), Sp. (2), V. (1).
Paris-Croydon ...	5	4	4	5	4	2 29	Spad F-CMAY (2h. 15m.) ...	B. (2), G. (1), Sp. (1), V. (1).
Cricklewood-Paris ...	1	6	1	1	1	3 22	H.P. G-EATK (3h. 22 m.) ...	H.P. (1).
Paris-Cricklewood ...	1	1	1	1	0	—	—	H.P. (1).
Croydon-Brussels ...	2	—	1	1	2	2 5	Airco 4 O-BABI (2h. 0m.) ...	A.4 (2).
Brussels-Croydon ...	2	—	2	2	2	?	?	A.4 (2).
Cricklewood-Brussels ...	1	—	—	1	1	2 19	Airco 9 G-EAUC (2h. 19m.)	A.9 (1).
Brussels-Cricklewood ...	2	—	2	2	0	—	—	A.4 (1), A.9 (1).
Totals for week ...	20	17	12	17	15			

* Not including "private" flights.

† Including certain journeys when stops were made *en route*.

‡ Including certain diverted journeys.

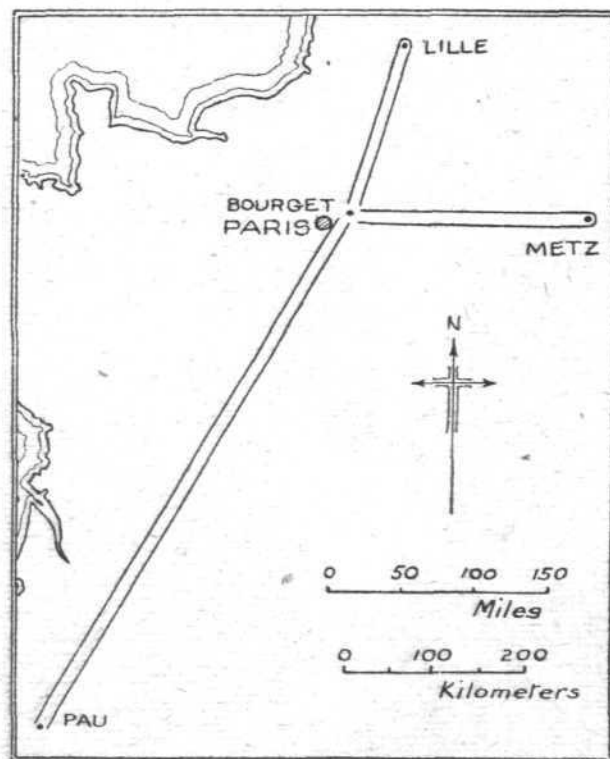
A.4 = Airco 4. A.9 = Airco 9 (etc.). Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T.
 F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. N. = Nieuport. P. = Potez.
 Sa. = Salmson. Se. = S.E. 5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.

The following is a list of firms running services between London and Paris, Brussels, etc., etc.:—Air Post of Banks; Co. des Grandes Expresses Aériennes; Handley Page Transport, Ltd.; Instone Air Line; Koninklijke Luchtvaart Maatschappij; Messageries Aériennes; Syndicat National pour l'Étude des Transports Aériens; Co. Transaérienne.

THE A.E.C.F. GRAND PRIX

It has been decided by the Aero Club of France, that the new cup and the prize of 200,000 francs offered to the Club by Mme. Deutsch, de la Meurthe, in memory of her husband, the late M. Henry Deutsch, de la Meurthe, shall be devoted to a competition for commercial machines built in France and owned by French concerns. It will be termed the Grand Prix de l'Aéro Club de France, and the regulations have just been issued. The first prize will be 100,000 francs, and the winner will also receive a gold medal, while the second will receive a silver-gilt medal and the third a silver medal. The classification will be according to the "commercial speed" of the machine over the complete course, but this must not be below 50 kiloms. an hour. The start will be made from Bourget, then on to Ponchin (Lille), turning above the aerodrome at a height not exceeding 200 metres, back to Bourget, where a landing must be made, then on to Pontlong (Pau) for another landing, back to Bourget, land again, then to Frescaty (Metz), turning above the aerodrome and back to Bourget for the final landing. Each competing machine must carry a load made up of (1) six sacks of sand, each weighing 80 kilogs., representing six passengers and each placed in the position in the cabin (which must be at least 1.4 metre high and 0.6 metre wide) which would be occupied by the corresponding passenger, and (2) 200 kilogs. of merchandise arranged in a space of at least half a cubic metre. The sand and the merchandise will be officially sealed.

Nine days will be devoted to the competition, arranged in three periods of three consecutive days. These have been arranged as follows: February 20, 21, and 22, March 20, 21 and 22, April 20, 21 and 22. The machines must be at the starting-place on the evening preceding the start and entries must be made to the Aero Club of France eight days before the start of each test.



A Novel Test on a de H.4.

A NOVEL experiment was recently carried out at the U.S. Aviation station in the Hawaii Islands. With a view to finding out how long a de H.4 would float if it was forced down on the water, an old machine had the water and petrol tanks filled, and with sacks of sand, to represent pilot and observer, in the seats, it was set afloat. In the first forty-five minutes the machine sank so rapidly that but half the fuselage, part of the upper wing and the tail surfaces remained above the water. From then on it sank very slowly and, at the end of 2½ hours, over half the stabiliser and all the rudder were still exposed. At the end of four hours the machine drifted ashore with the rudder still above water.

The Frankfort-Basle Service

For several weeks the air service between Frankfort and Basle has been maintained under difficulties, as the Entente Powers have refused to allow the machines to leave Germany. Under these circumstances the machines have had to land at Lorrach quite close to the Swiss frontier.

Vienna as Aerial Interchange Station

FROM a message to hand from Vienna it appears that the Austrian capital has aspirations to become the aerial "Clapham Junction" of Europe. As a result of a conference between the Mayor and the Inter-Allied Commission of Control, a commission has been appointed to consider the "creation of a big international base for air travel."

AIRISMS FROM THE FOUR WINDS

THE resignation of Major-General E. D. Swinton from the Air Ministry, where he has done such admirable work as Controller of Information in the Department of Civil Aviation, is, in the interests of future developments, to be greatly regretted. As the original "Eye-Witness" during the War, his contributions to the Press will be remembered by all. But it is Gen. Swinton's great organising gifts which should have ensured his remaining with the Air Ministry. We shall, however, hope that his co-operative help will still be available for the benefit of civil aviation, which we are all hoping will make its initial mark during 1921.

THOSE Zepp. bombs are still turning up in the most unexpected quarters. The latest was discovered by workmen cleaning out a gas-holder at the South Metropolitan Gas Works, Thames Street, Greenwich, last week. This live explosive bomb was embedded in the tar at the side of the holder, and it is believed to have been dropped from a Zeppelin in one of the earlier raids.

MALTA, according to Capt. Blandy, of the Civil Aviation Department, is likely to become the first stop on the airship route to Egypt and the East. He has been inspecting on the island for suitable aerodrome sites, against the advent there of "L.36" on its trial trip. Should, as all hope, the service become a regular one, Malta should benefit no little, as it would mean that London letters would be delivered there within 24 hours. At present Malta has no regular mail service, and the local government, which has been inviting tenders for the conveyance of mails between Malta and Sicily, has apparently received none, for the time for sending in the tenders has just been extended. Captain Blandy has promised to mention the local mail difficulties in his report to the British Air Ministry, and to suggest for their consideration the question of an air service from Malta to Sicily.

THAT appreciation by the Prince of Wales of the position into which the Ex-Service Men's Carnival and Exhibition at the White City was drifting and his prompt application of a remedy by an immediate visit, has set the pace to the public. Attendances have since been hugely improved, and the thoroughly interesting show now promises to result in material benefit to the ex-Service men's cause for which it was organised. It was a graceful thought which evolved the idea of dropping from an aeroplane a sealed message shortly before the Prince's

arrival, addressed to him, containing the thanks of ex-Service men for his interest in and encouragement of their scheme. It was a popular visit made in the Prince's characteristically popular form.

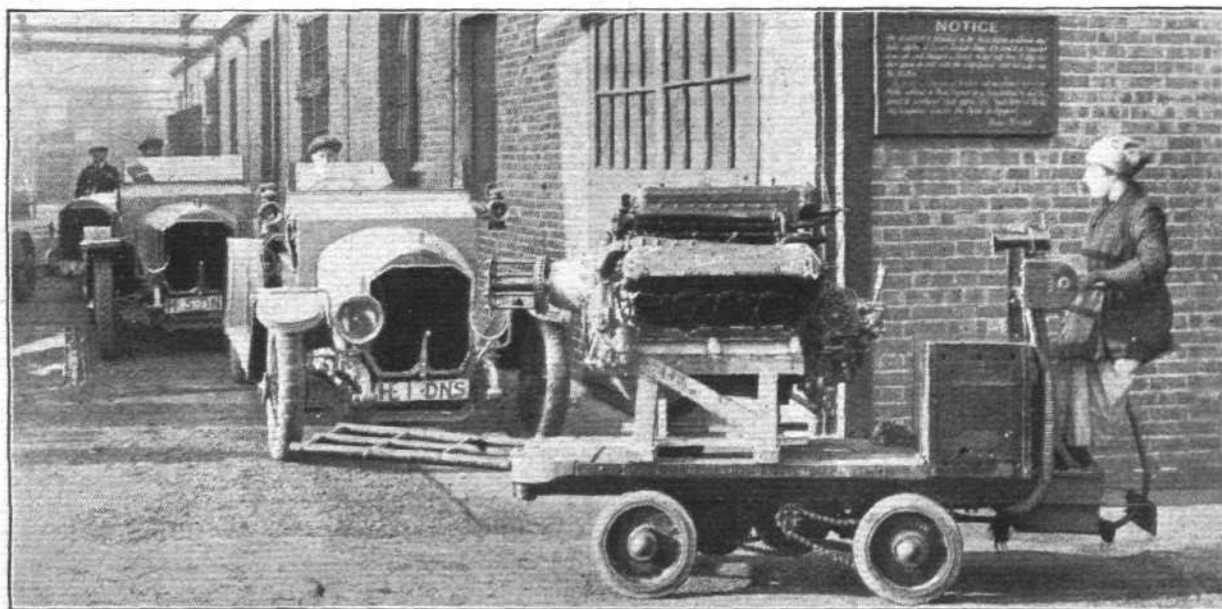
M. BLÉRIOT was the first to cross the Channel by aeroplane. Quite so, we all know there's nothing particularly new about that. But now M. Blériot is to score another "first." This time it is the inauguration of Messrs. Hampton and Sons' new and beautiful estate auction rooms at 20, St. James' Square, where the first auction is now announced to take place on April 12th, the property to be offered, by direction of M. Louis Blériot, being Riverdale, Bourne End, Bucks, "a property upon which a fortune has been lavished," the contents of the house also being available for acquisition.

AEROPLANES have again come in handy in Ireland, where the authorities have used them owing to the cutting of telegraph and telephone wires and the blocking of roads with trees and trenches over an area of several miles in the Dublin, Meath and Kildare districts, for scouting for military parties engaged in patrol work.

It is again affirmed that, subject to expert advice, aeroplanes will be used in connection with the expedition which is to tackle the "roof of the world," Mount Everest. The 'planes, it is suggested, can be used for reconnaissance, for telephotographic purposes, and possibly for dropping stores at high altitudes. It is obvious that if it is possible for aeroplanes to land safely and rise again on the great height to which Everest reaches, the work of the expedition will be greatly simplified, as the great handicap of the effects of exertion in climbing at such altitudes would thereby be neutralised.

THE Navy and Army Canteen Board has been reconstituted under the title, "The Navy, Army and Air Force Institutes."

THAT short but severe gale on Monday afternoon this week sent most things living home pretty quickly. But in the teeth of the gale Lieut. R. H. MacIntosh, the Handley Page cross-Channel pilot, brought his aeroplane with four passengers from the Continent. People at Dover saw the giant machine fighting against the wind, buffeted every minute by huge gusts, but always making headway. Lieut. MacIntosh safely landed his machine at Lympne.



An interesting photograph taken in the area of the Napier works at Acton, showing a 450 h.p. Napier aero engine being conveyed on an electric truck (used for transporting all kinds of material both raw and finished) to the packing department for shipment abroad. In the background may be seen three of the well-known 40-50 h.p. six-cylindered Napier chassis, the other product of this huge factory, about to leave the works for their road tests, such tests being rigorously carried-out on all Napier chassis before delivery to the coachbuilders. Napier aero engines, it will be recalled, were fitted to the Vickers-Viking, the Handley Page and the Westland aircraft, which gained the highest prizes in each of the three classes in the recent Government competitions.

Personals

Married

Flying Officer DESMOND HERLOUIN DE BURGH, A.F.C., R.A.F., only son of Col. Ulick de Burgh, C.B., was married on January 5, at Trinity Church, Sissinghurst, to NORAH DOROTHY, younger daughter of the late Capt. R. G. A. SHARP and Mrs. SHARP, of Sissinghurst Grange.

The Rev. HENRY MARSHALL, R.A.F., M.A., son of the late Henry Marshall and Mrs. Marshall, of Radcliffe-on-

Trent, was married on January 6, at St. John's Church, Chatham, to EVELYN RUTH, youngest daughter of Mr. and Mrs. COLE, 38, Maidstone Road, Chatham.

Item

The will of Capt. GURTH ALWYN RICHARDSON, R.A.F. (Wireless Section), of Eaton Cottage, Unthank Road, Norwich, who was killed in Ireland on October 10 last, has been proved at £685.

ROYAL AERONAUTICAL SOCIETY NOTICES



Lectures.—The first lecture of the second half of the 56th Lecture Session will take place at 5 p.m. on January 20, when Lord Montagu of Beaulieu, C.S.I., M.P., will read a paper on "The Cost of Air Ton-Miles compared with other Forms of Transport."

Library.—The following book has been received and placed in the Society's Library: "Rendiconti Dell' Istituto Sperimentale Aeronautico di Roma," September, 1920.

W. LOCKWOOD MARSH, Secretary

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The Legion of Honour

A RECENT *Journal Officiel* announces that, on the nomination of the Under-Secretary for Aeronautics, the following promotions and appointments have been made in the Legion d'Honneur:—

Officers: MM. L. Bréguet, A. Leblanc et R. Soreau.

Chevaliers: MM. E.-M.-G. Lepère, E. Serre, E. Bossoutrot, Robert Jacques, Jacques Mortane, E.-M.-J. Montgermon, A. Herbemont, M. Vuillerme, Garsaux, Louis Capazza, de Lafreté.

Service in the French Air Force

LAST week the French Minister of War issued an order authorising, for a period of several weeks, engagements for three years to be made in the aeronautic service.

An Order from the French Government

THE Liore and Olivier concern are said to have received an order from the French Government for fifty Breguet machines to be constructed during the coming year. During the past year the firm have been working on a military machine fitted with two 600 h.p. Hispano-Suiza motors, while they have another ready for testing which has three Rhône motors.

A 35-Hour Farman

AT present the world's duration record stands at a little over a complete day—24 hrs. 19 mins. 7 secs., to be exact—the performance standing to the credit of the Farman "Goliath." It may not stay there long, however, as a new Farman "Goliath" has been built with a view to making a continuous flight for 35 hours. The pilots will be Bossoutrot (when he recovers from his present illness) and Bernard, the two who set up the present record.

An American Endurance Record

MOUNTED on a Curtiss "Eagle," of the ten-passenger type, modified to enable it to carry sufficient fuel, etc., for 35 hours, Lieut. Kilpatrick on December 21 set out to beat the world's duration record. He had to land on the morning of December 22, however, owing to a leak in one of the petrol tanks, after being up for 18 hours 5 minutes.

American A.A. Experiments

APPARENTLY the U.S. army is not by any means neglecting the subject of anti-aircraft gunnery, and according to one report the work is not without its thrills for the pilots of the aeroplanes which are assisting. At Fort Monroe recently, anti-aircraft batteries were firing shrapnel within 400 to 500 yards of the observing aeroplane, from which, by means of a wireless telephone, the height and direction of the burst was communicated to the commander of the battery.

A Mammoth Airship Project

A REFLECTION of the fact that the United States are still nominally at "war" with Germany is found at the tail-end of a huge airship proposal referred to in the Report of the Director of the United States Air Service for 1920. This reference is preceded by the statement that "During this fiscal year the Air Service failed in an attempt to secure the latest type of rigid airship. This project arose from the investigations performed by a representative of the air

service who was sent to various European countries to investigate the airship situation. This representative first attempted to secure the German airship 'L.72.' This ship, the largest in existence, was built during the War for the purpose of bombing New York City. The German Government interposed no objections to the sale of this ship, but it was found that the purchase was impossible because this airship had been allotted to another country under the terms of the Treaty of Versailles.

"Negotiations were then entered into with the Zeppelin Airship Co. for the construction of the 'L.Z.125,' with dimensions as follows: Length, 774 ft. 3.5 ins.; width, 98 ft.; height, 111 ft. The gas capacity was to be 3,531,660 cubic ft., which would furnish a disposable lift of 69 tons. A cruising radius of 12,000 miles and a maximum speed of 91 miles per hour were promised. It was planned that its construction should be undertaken as soon as the provisions of the Treaty of Versailles would permit German manufacturers to engage in aeronautical construction. Because of the low rate of exchange the cost of this airship would have been only \$500,000, which would have included the training in Germany of an American crew to fly the airship to the United States. The Air Service was informed that the existing status of our relations with the German Government would not permit the consummation of this project."

Rio to Buenos Aires by Air

THE Brazilian pilot, Senhor Eduardo Chaves, arrived on December 29 at Buenos Aires from Rio de Janeiro in a Curtiss seaplane by the following stages:—

On December 25th he reached São Paulo; the 26th, Guaratuba; 27th, Porto Alegre; 28th, Montevideo; and on the 29th Palomar, close to Buenos Aires. Senhor Chaves covered 1,550 miles, at an average speed of 93 miles an hour.

New German Services

THE Sachsische Luftreederei has obtained from the Allied Commission of Control permission to run an aerial mail service between Dresden and Leipzig and Dresden and Berlin.

The air-post between Berlin and Munich, which is being run by the German Luft-Lloyd Company, was officially opened on January 4. The machines in this service are designed to carry passengers, and the fare is 800 marks (£3).

Germany's Practical Air-Work

"THE Hamburg-Berlin-Nuremberg-Munich daily service opened last week is now being flown over a distance of 465 miles of German territory, and the Hamburg-Berlin-Breslau line represents a daily flight of 315 miles, the aeroplanes carrying mails to other important cities *en route*," states the *Handley Page Bulletin*. "A temporary aviation measure with the Swiss Federal authorities was ratified by the Reichstag at the end of last year, and the German-Swiss aerial connections are flying *via* Lorrach, and also *via* Konstanz. The Berlin-Stettin-Danzig-Koenigsberg line is also a *fait accompli*, and official aviation time-tables for 1921 show that practically every town of importance in Germany will be linked up by the air mails.

"The air services are also being timed to connect with the mail trains to towns off the flying routes, and the motor-cycle is being utilised for the distribution of local mails to outlying places. The daily Press is beating the drum vigorously in the interests of civil aviation, and everything points to the development of the German Air Services in 1921 on a scale which is calculated to surprise even the British Air Ministry.

"The best way of making the new services a paying proposition in the near future has not been lost sight of, and German aeronautical engineers profess to have a monoplane available, capable of carrying 2 cwt. of freight a distance of 315 miles on a total consumption of 12 gallons of fuel. The adoption of a number of these small planes will, it is said, make civil aviation a paying proposition."

THE ROYAL AIR FORCE

London Gazette, December 21, 1920

Technical Branch

Sec. Lieut. R. Adams to be Lieut. Grade (B.); June 28, 1919. Sec. Lieut. E. N. Hewitt to be Lieut. Grade (A.) without pay and allowances of that rank; April 2, 1918. Lieut. J. E. Spickernall relinquishes his temp. R.A.F. commn. on appt. to T.F. Res., and is permitted to retain his rank. Flying Officer T. D. Jones (Commissioned Shipwright R.N.) relinquishes his temp. R.A.F. commn. on return to Royal Navy; Dec. 6.

Transferred to Unemployed List.—Capt. S. C. Ramsey; Jan. 12, 1919. Sec. Lieut. F. C. Weatherley; Feb. 15, 1919 (substituted for *Gazette*, March 4, 1919). Sec. Lieut. C. H. Bonn; May 21, 1919 (substituted for *Gazette*, May 13, 1919).

Dental Branch

Transferred to Unemployed List.—Lieut. A. G. Marks; Aug. 8, 1919. Lieut. G. J. Roberts; Sept. 28, 1919.

Memoranda.

Thirty-eight Cadets are granted hon. commns. as Sec. Lieuts. with effect from the date of their demobilisation.

London Gazette, December 24, 1920

Permanent Commissions

Sqdn. Ldr. D. R. MacLaren, D.S.O., M.C., D.F.C., resigns his permanent commn., and is permitted to retain the rank of Major; Nov. 1.

Short Service Commissions

Flt. Lieut. L. A. McDougald relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain the rank of Capt.; Dec. 25.

Flying Officer F. H. Rowan relinquishes his commn. on account of ill-health contracted on active service, and is granted the rank of Capt.; Dec. 25.

Flying Branch

Sqdn. Ldr. R. B. Ward, A.F.C., is placed on the half-pay list (Scale B.); Dec. 21. Lieut. C. H. Windrum (Lieut., R. West Kent R.) relinquishes his temp. R.A.F. commn. on return to Army duty; May 15, 1919. Lieut. C. A. Bryant relinquishes his temp. R.A.F. commn. on appt. to the T.F., and is permitted to retain his rank.

Transferred to Unemployed List.—Lieut. J. W. Trusler; March 13, 1919 (substituted for *Gazette*, July 29, 1919). Lieut. D. B. Gayford; March 29, 1919. Capt. (actg. Maj.) J. A. Cochran, M.C.; June 6, 1919. Lieut. I. B. Hyslop; Oct. 3, 1919. Lieut. R. W. Gunner, Lieut. F. W. Jordan; Oct. 10, 1919.

Lieut. J. Valentine relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; Dec. 23. Sec. Lieut. B. Dixon relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; Dec. 23. Sec. Lieut. J. N. Bitton (unemployed list) is deprived of his commn. on conviction by the Civil power; Dec. 6.

Administrative Branch

Transferred to Unemployed List.—Capt. H. Born-Murdoch; Jan. 8, 1919. Lieut. R. W. Hyde; Sept. 24, 1919. Lieut. W. E. N. Growdon; Oct. 8, 1919.

Technical Branch

Flying Offr. J. Durward relinquishes the grading for pay and allces. of Flight Lieut. on ceasing to be employed as Flight Lieut.; Sept. 9 (substituted for *Gazette*, Dec. 7). Capt. C. E. H. Briggs relinquishes his temp. R.A.F. commn. on ceasing to be empd.; March 4, 1919.

Transferred to Unemployed List.—Lieut. H. R. Hardy, Lieut. A. T. Hawkins; Sept. 6, 1919. Sec. Lieut. F. Hembley; Sept. 16, 1919. Lieut. J. W. Power; Sept. 24, 1919. Sec. Lieut. F. P. Revie; Oct. 22, 1919. Lieut. J. S. Ferguson; March 5 (substituted for *Gazette*, March 16).

Gazette, June 3, 1919, concerning Lieut. G. H. Thomas is cancelled. *Gazette*, July 15, 1919, concerning Lieut. G. H. Thomas is cancelled.

Memoranda

Twenty-six Cadets are granted hon. commns. as Sec. Lieuts., with effect from the date of their demobilisation.

Capt. G. F. Evans, O.B.E., is transfd. to unempld. list (from S.O.); Oct. 28, 1919.

London Gazette, December 31, 1920

Promotions

The following offrs. are promoted to ranks stated, with effect from January 1, except where otherwise noted:—

General List

Group Capt. to be Air Commodore.—F. C. Halahan, C.M.G., D.S.O., M.V.O. Wing Comdrs. to be Group Capt.—J. L. Forbes, O.B.E., A. G. Board, C.M.G., D.S.O., A. B. Burdett, D.S.O., J. A. Chamier, C.M.G., D.S.O., O.B.E. F. W. Bowhill, C.M.G., D.S.O.

Sqdn. Leaders to be Wing Comdrs.—E. L. Gossage, D.S.O., M.C., G. R. Bromet, D.S.O., O.B.E., N. G. Darnell, E. R. C. Nanson, D.S.O., A.F.C., F. K. Haskins, D.S.O., S. Smith, D.S.O., A.F.C.

Flight Lieuts. to be Sqdn. Leaders.—A. S. Morris, O.B.E., G. H. Bowman, D.S.O., M.C., D.F.C., W. R. Read, M.C., D.F.C., A.F.C., M. Henderson, D.S.O., G. W. Roberts, M.C., F. L. Robinson, D.S.O., M.C., L. L. MacLean, R. B. Maycock, O.B.E., K. R. Park, M.C., D.F.C., W. B. Callaway, A.F.C., D. G. Donald, D.F.C., A.F.C.

Flying and Observer Offrs. to be Flight Lieuts.—D. Gilley, D.F.C., A. S. Thompson, T. F. N. Gerrard, D.S.O., F. N. Hudson, M.C., H. G. White, B. E. Harrison, A.F.C., H. P. Lale, D.S.O., D.F.C., J. H. Green, W. H. Park, M.C., D.F.C., H. W. McKenna, D.C.M., W. B. Everton, D. Drover, A. L. Russell, C. B. Dick-Cleland, D. W. Grinnell-Milne, M.C., D.F.C., H. B. Russell, A.F.C., A. H. Goldie, H. O. Long, D.S.O., R. Gambier-Parry, C. H. Tancred, M.B.E., T. J. West, M.C., C. R. Keary, T. S. Ivens, T. C. Luke, M.C., R. C. Jenkins, M.C., L. H. Pakenham-Walsh, D.F.C., C. McM. Laing, M.C., A.F.C., F. H. Sims, A. W. Symington, M.C., A. J. Elliott, R. C. Preston, A.F.C., P. H. Cummings, D.F.C., K. H. Brown, D.F.C., G. H. Boyce, A.F.C., H. W. L. Saunders, M.C., D.F.C., M.M., C. T. Anderson, D.F.C., B. C. Adamson, J. T. Vernon, W. A. Coryton, M.V.O., C. Fenn.

Medical Branch

Wing Comdrs. to be Group Capt.—D. Munro, C.I.E., F.R.C.S. (E.) (with effect from December 31, 1920), N. J. Roche, O.B.E., H. V. Wells, C.B.E.

Sqdn. Leader to be Wing Comdr.—J. MacGregor, M.C., M.D.

Flight Lieuts. to be Sqdn. Leaders.—T. J. Kelly, M.C., M.B., B.A., R. S. Overton.

Stores Branch

Sqdn. Leader to be Wing Comdr.—C. G. Smith, O.B.E.

Flight Lieuts. to be Sqdn. Leaders.—W. J. Waddington, O.B.E., L. Anker, O.B.E., R. W. Thomas, T. L. Stevens, G. E. Stagg, M.B.E., E. W. Havers, G. A. Hilliar, C. L. Archbold, J. Rylands, F. A. Baldwin, H. T. Foxen.

Flying Officers to be Flight Lieuts.—P. M. Brambleby, A. J. M. Ross, M.B.E., F. Grave, M.B.E., J. Roberts, H. V. Jerrard, A. R. Thomas, W. J. King, D.C.M., E. M. Cashmore, T. Bell, M.M., F. Petch, M.B.E., W. Thorne, J. Walker, A. J. Briddon, A. W. Smith, A. W. Turner, C. M. Bevan, H. W. Clarke, T. H. Evans, C. Harvey, W. C. Green, M.C., G. F. Law, D. Mitchell, H. P. Bridges, E. S. Baker, G. Oliver, W. R. Fairbairn, E. R. Webb, I. Surr, F. Anderson.

Short Service Commissions

Flying Officer C. H. Billings resigns his short service commn., and is permitted to retain the rank of Lieut.; Nov. 25, 1920.

Observer Officer W. G. Hanton resigns his short service commn. and is permitted to retain the rank of Lieut.; Dec. 23, 1920.

Flying Branch

Capt. Hon. E. G. W. T. Knollys, M.B.E., relinquishes his temp. R.A.F. commn. on appt. to the T.F. Reserve, and is permitted to retain his rank. The following Lieuts. relinquish their commns. on appt. to the T.F., and are permitted to retain their rank:—D. I. W. Gray, J. H. Halliwell. Sec. Lieut. (Hon. Lieut.) S. E. Towill relinquishes his temp. R.A.F. commn. on appt. to the T.F., and is permitted to retain the rank of Lieut.

Transferred to Unemployed List.—Capt. A. C. Hatfield; July 31, 1919. Sec. Lieut. F. M. Grey; Sept. 9, 1919. Lieut. R. T. Griffin; Sept. 16, 1919. Sec. Lieut. H. W. Jeffreys; Dec. 29, 1919 (substituted for *Gazettes*, Jan. 27, 1920, and Feb. 3, 1920). Lieut. J. Golman; Dec. 18, 1920.

Lieut. D. W. Beard relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; Dec. 10, 1920. Lieut. V. Henry relinquishes his temp. R.A.F. commn., and is permitted to retain his rank. Sec. Lieut. P. R. Blythe relinquishes his commn. on account of ill-health, and is permitted to retain his rank; Dec. 25, 1920.

Administrative Branch

Sec. Lieut. E. A. Wilson is transferred to Unemployed List; Feb. 4, 1919. Sec. Lieut. W. MacPherson relinquishes his temp. R.A.F. commn. on appt. to the T.F., and is permitted to retain his rank.

The permission granted to Capt. (actg. Maj.) H. W. R. Haselhurst to retain the rank of Maj., as stated in *Gazette* of Feb. 18, 1919, is cancelled on his appt. to a commn. in the Army.

Technical Branch

Lieut. F. W. Nicholson relinquishes his temp. R.A.F. commn. on appt. to the T.F. Reserve, and is permitted to retain his rank.

Transferred to Unemployed List.—Lieut. L. C. Bottoms; Sept. 22, 1919. Lieut. L. F. W. Stone; Oct. 10, 1919.

Medical Branch

The following Flight Lieuts. are granted the hon. rank of Sqdn. Leader:—J. Keenan, J. N. Macdonald, J. Valerie, O.B.E.; Jan. 1.

Memoranda

Three Cadets are granted hon. commns. as Sec. Lieuts. with effect from the date of their demobilisation.

London Gazette, January 4, 1921

Flying Branch

Pilot Officers to be Flying Officers.—W. Murphy (since demobilised); December 13, 1919. H. G. Mayhew (since demobilised); March 21, 1920. H. Lansdale (since relinquished commn.); March 22, 1920. Sec. Lieut. E. Fulford is antedated in his appt. as Sec. Lieut. (A. and S.); July 6, 1918 (since granted a short service commn.). Lieut. A. W. Martin relinquishes his temp. R.A.F. commn. on appt. to T.F. Res., and is permitted to retain his rank. Lieut. C. R. Richards, M.C., is transfd. to the unempld. list; June 26, 1919 (substd. for *Gazette*, August 5, 1919).

AVIATION IN PARLIAMENT

Hants Aircraft Park Territorial Force (Gratuity)

VISCOUNT WOLMER on December 22 asked the Secretary of State for Air whether the officers of the Hants Aircraft Park Territorial Force are eligible to receive a gratuity; and, if so, at what rate?

Mr. Churchill: An application on behalf of these officers for payment of gratuity has been received and is being investigated. Detailed information as to their individual conditions of service and scales of pay is being obtained, and a decision will be conveyed to them as soon as practicable.

R.A.F. (Convent, Farnborough)

VISCOUNT WOLMER asked the Secretary of State for Air whether the Air Ministry is still renting the Star Hill Convent, together with its school and chapel, at Farnborough, Hants; if so, how much rent is being paid for the buildings; if they are occupied; and, if not, how long they have remained unoccupied?

Mr. Churchill: Royal Air Force occupation of these premises ceased on

November 6, 1919, on which date they were relinquished. No rent is being paid.

Air Navigation Over Germany, etc.

In the debate on the Air Navigation Bill in the House of Lords on December 22, Lord Montagu of Beaulieu urged that the time had come when they should secure the co-operation of Germany and Austria with a view to extending international aviation. If we were to have a direct route to India we must pass over those countries.

The Marquis of Londonderry replied that the question was receiving very sympathetic consideration. The noble lord was no doubt aware that the view he had put forward was not universally held on the Continent. The matter was continually before the Convention, and while it was not possible for the Government to hold out any hopes, everything possible was being done.

The Commons' amendments were agreed to.

MODEL AEROPLANES

NOTE.—All communications should be addressed to the Model Editor. A stamp should be enclosed for a postal reply.

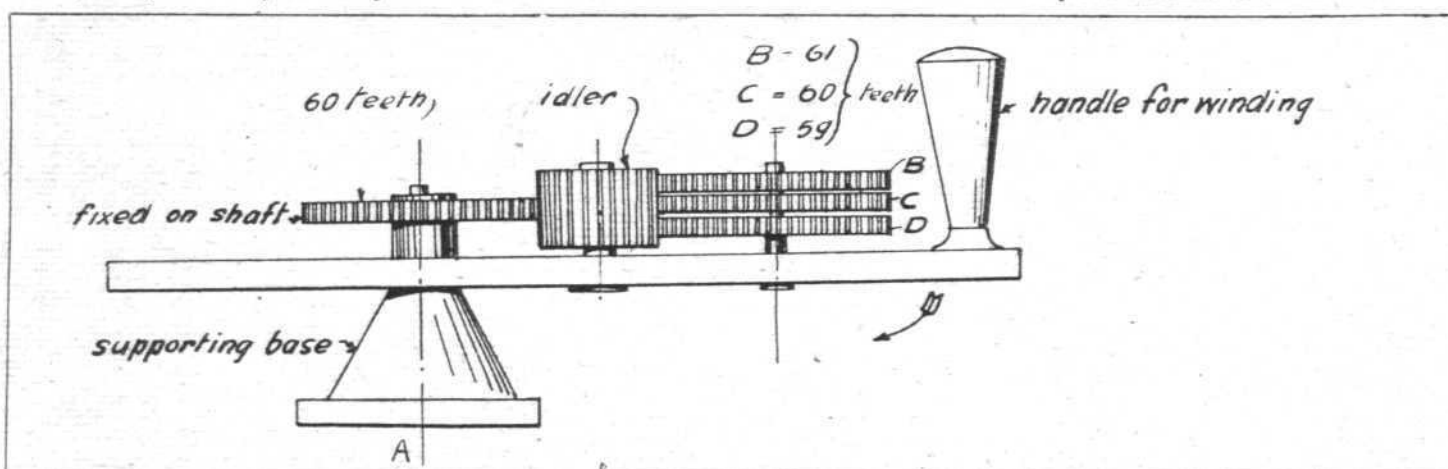
A Mechanical Paradox

ALTHOUGH the subject here illustrated does not strictly come within the sphere suggested by the heading to this page, I consider it to be such an interesting discovery and its possibilities so great that I have deemed it worthy of the reader's attention. It is a mechanical paradox. It does everything which even engineers will argue it won't—till you show them how.

The apparatus consists of three superposed wheels, free on a shaft, gearing into an idler pinion, and a wheel fixed on shaft. All teeth are in mesh and remain so. If the whole train of wheels be revolved in a planetary fashion about axis A as indicated by the arrow, in what direction do the wheels B, C and D rotate? The fixed wheel with axis A has 60 teeth; the pinion may have any convenient number of teeth

They complicate matters out of all proportion to their utility, affect stability, require an abnormal amount of power and are generally undesirable. Except in exceptional circumstances I would not advise their use.

Whilst on the subject it is well to enquire why twin screws have not been more usually applied to tractors, where torque makes itself more apparent than with canards. The screws would need to be more accurately carved from the points of view of weight and pitch angles, the amount of power and number of turns given to each, so that the thrust developed would be very nearly the same. Inaccuracies in these matters are comparatively unimportant with canards, in so much as the model will still fly if the error is not pronounced; with a tractor they make flight impossible, and cause all manner of weird evolutions directly attributable to them.



and is merely an idler, and the wheels B, C and D have 61, 60 and 59 respectively. They all have the same outside diameter. You will at once say that they will all revolve in the same direction but at different velocities—but you will be wrong. Wheel B goes one way, wheel C stops still, and wheel D moves in a direction *opposite* to B. Impossible you say—try it. I wonder if any reader is clever enough to spot the solution? I will give a copy of my book to the first correct solution opened. It's not so simple as it looks.

Four-Bladed Screws

A READER enquires whether a model with four screws, two in front of the mainplane and two behind, working tandem fashion, should all have the same pitch. They should not. As the two rear ones will be working in the slip-stream of the other pair, it is obvious they should have a slightly coarser pitch, say 2 deg. greater pitch angle. A similar effect could be gained by making the rear two the same pitch, but of larger diameter than the forward pair.

Models with four screws have not been experimented with to any extent, possibly because the performance does not warrant it. It is necessary to examine fundamentals in order to see whether four screws are justified (these remarks, of course, applying only to models, as with full-size machines questions of diameter power to be absorbed and thrust required enter the proposition).

I think it is patent to all modellers that two screws do not give a performance equal to double that of a single screw. If a single-screw pusher model does 60 secs., it won't do 120 secs. by fitting twin screws. Actually it may do something less than 80. Twin screws are merely used to balance propeller-torque, and also to obtain straighter flights than is possible with single-screw machines. If, therefore, twin screws balance torque and give directional stability and control, it seems no useful purpose is served by fitting four screws.



Arkansas City has a "Flying Frolic"

FROM an account to hand the people of Arkansas City went nearly crazy over a very successful aviation meeting—the first to be arranged, and held the middle of December.

Manchester Aero Model Association

At a meeting of model enthusiasts in the Manchester District, held on December 18, 1920, at Mr. Perry's workshop, it was decided to form a Club, and the above title was adopted.

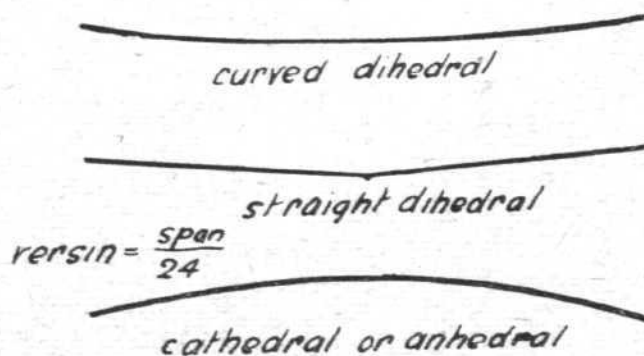
Mr. Lewis Perry, 67, Rosamond Street, West, C.-on-M., Manchester, was elected acting hon. secretary, and would be pleased to hear from prospective members in Manchester and districts.

Replies to Correspondents

A.E.P. (Portsmouth).—I have replied direct to your letter.

H.B. (Leicester).—I am dealing at length with your letter in an early issue.

L. M. (Portsmouth).—Of the three dihedrals shown in the appended sketch, the centre one is much to be preferred; it



gives "stiffer" stability as compared with the rolling stability of the curved, and the extremely erratic stability of the cathedral.

A local concern—the Williams Aeroplane Co.—was responsible for the show, and they hope to make an annual affair of it. Five out of seven prizes were secured by de Havilland machines and a German Fokker.

SIDE-WINDS

BARIMAR, LTD., have a reputation for not staying at home. Another important development has just been concluded by the establishment of an Australian branch factory in Brisbane. Headquarters have been secured at 150, Elizabeth Street, and will be in the capable hands of Mr. F. O'Donnell, a man of considerable business attainments. He is well-known throughout Queensland, and during the War held the rank of Colonel with the Australian forces in Gallipoli. The position of works manager will be filled by Mr. G. D. McKenzie, who is recognised as a leading welding authority in Australia. The premises are, we understand, fully equipped with all the latest appliances and plant, and all effective processes in every phase of the welding industry will be operated. Although the present headquarters are in Queensland, arrangements are being made to establish branch factories throughout the whole of Australia. Expert British welders sailed for "down under" on the Orient liner S.S. *Ormonde* on December 18 last. These men have received their training in the London works of Barimar, and are thoroughly conversant with the re-creation of all kinds of broken motor-car parts, and all classes of locomotive and boiler repairs, ship and marine work. In addition, a specially trained artisan will operate the Barimar metallurgical process for repairing scored cylinders and the salving of new castings which, through blowholes or other blemishes, would otherwise have to be scrapped.

An artistically produced catalogue has just come to hand from the Sunbeam Motor-Car Co., describing and illustrating the 1921 models of this famous make of motor-car. As is stated in the foreword, the outstanding success of the 1920 16 h.p. and 24 h.p. Sunbeam models determined the company to adhere more or less closely to the same chassis designs for their 1921 models. In fact the 1921 chassis reveal but slight differences in matters of detail. In the coachwork, again, several minor alterations are to be found, all of which make for greater comfort, and an entirely new model has been added to the list, in the shape of an exceedingly handsome totally-enclosed saloon, which should appeal specially to those who drive their own cars.

It is a matter of common knowledge that every British flying record made, and practically every prize won, during 1920 appears on the record of successes of Wakefield Castrol R. By way of neatly finishing off the year's work was the remarkable 55 hours' test of the Napier "Lion," particulars of which have already been given in our columns. Once again Castrol R. was the lubricant enabling this engine to go through probably the most severe test that any aero engine has been subjected to up to date.

Those who are interested in the subject of case-hardening will find much useful information in a booklet just published by Messrs. N. Taylor and Son, of 17, Goree-Piazzas, Liverpool, makers of Hydro-carbonated bone black for case-hardening. It touches on such topics as apparatus, materials, packing, re-heating, hardening heats, as well as giving a good deal of general information on the subject.

NEW COMPANY REGISTERED

TOY AERIAL, TERRENE AND SUB-AQUAL MOTOR CO., LTD., 18A, Northampton Square, E.C.1.—Capital £1,000, in £5 shares. Objects: to make, experiment with, and test (in order to determine their relative value) small toy flying machines (e.g., mechanical birds, ornithoptera, aeroplanes, airships and figures of men and animals), small toy motor-wheels, and other terrene mechanically-propelled vehicles, according to the inventions of H. Middleton, small toy submarine vessels, etc. First directors: H. Middleton, R. D. Middleton (Demonstrator, Northampton Polytechnic Institute), R. W. Middleton (Junior Demonstrator, N.P.I.).

PUBLICATIONS RECEIVED

Calendar, 1921. Harrison, Jehring and Co., Ltd., Emerald Street, London, W.C.

Aeronautics. Sixth Annual Report of the National Advisory Committee for Aeronautics, 1920. Navy Building, Washington, D.C., U.S.A.

Song. "His First Solo." Words by D. Shelley Carr, Music by H. Morley Acré. Chevalier and Morland, Amersham, Bucks. Price 2s. net.

Le Compas de Navigation Aérienne. By J. Rouch. Paris: Masson et Cie., 120, Boulevard Saint-Germain. Price 10 francs net.

Case-Hardening. N. Taylor and Son, 17, Goree-Piazzas, Liverpool.

IMPORTS AND EXPORTS, 1919-1920

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; and for 1919, see "FLIGHT" for January 22, 1920.

	Imports.		Exports.		Re-Exportation.	
	1919.	1920.	1919.	1920.	1919.	1920.
	£	£	£	£	£	£
January ...	555,989	2,323	57,571	32,752	—	697
February ...	453,822	9,320	57,972	68,932	—	—
March ...	704,424	2,092	72,716	67,600	400	—
April ...	97,662	5,918	25,433	148,484	—	—
May ...	136,631	761,425	38,428	237,627	—	400
June ...	1,410	491	41,526	300,572	—	61,150
July ...	136,463	51,020	41,290	286,646	—	—
August ...	67,292	116	60,581	130,774	—	2,544
September ...	172,192	386	65,349	302,802	—	—
October ...	132,243	445	87,635	106,954	500	913
November ...	44,713	9	67,831	165,607	7,200	—
December ...	1,671,101	2,805	80,660	69,720	2,030	405
	4,173,942	836,350	712,784	1,918,470	10,130	66,109

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1919

Published January 13, 1921

- 22,061. L. HINZ and F. MARTIN. Aeroplanes. (155,343.)
- 23,929. P. J. SCHELB. Propelling and manipulating aircraft, etc. (155,397.)
- 27,373. BOULTON and PAUL and J. D. NORTH. Metal struts. (155,428.)

APPLIED FOR IN 1920

Published January 13, 1921

- 237. T. VON KARMAN and W. ZUROVEC. Captive helicopter flying-machines. (137,332.)
- 1,818. J. D. CARROLL. Rotary engines. (140,376.)
- 11,832. ASTRA SOC. ANON. Braking-devices for wheels. (143,479.)
- 19,623. WESTINGHOUSE ELECTRIC and MANUFACTURING Co. Aeroplane propellers. (155,525.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages xv and xvi).

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